VULGAR
ARITHMETICK
Improved;

OR,

Merchants Accompts
MADE EASY.

CONTAINING

Great Variety of *Improvements* in all thoſe *Rules* of ARITHMETICK, which commonly go under that Title; but eſpecially the *Golden Rule* and *Practice*, as they are the Ground, and Foundation of all the reſt, are largely inſiſted on.

With an APPENDIX,

Containing XXVI Compendious methods of caſting up moſt ſorts of Merchandiſe, never before publiſhed. The whole perform'd by whole Numbers only, and applyed throughout to *Trade* and *Merchandiſe*.

By HENRY GORE, *Teacher of the* Mathematicks, *in* MANCHESTER.

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BRITISH MUSEUM

TO THE
MERCHANTS
AND
TRADESMEN
Of the TOWN *of*
MANCHESTER.

GENTLEMEN,

WHEN I conſider the many Favours I have received from you, and the ſubject of the following Treatiſe, I cannot think to whom I can more properly inſcribe it. A Treatiſe calculated, (as I hope this is,) for the ſervice of Tradeſmen, calls for their Protection. And as I have the Pleaſure to think I have been inſtrumental in fitting ſome of your Progeny for *Trade*, I may, I hope, lay claim to yours in a more particular manner.

Your daily Experience, (Gentlemen) makes it unneceſſary for me to ſay any thing in Favour of the *Art* I am to treat about, and the Obligations I am under have come from ſo many Perſons, that I thought my ſelf in Duty bound to make this publick Acknowledgment, and to aſſure all my Friends, that this is the Reaſon why I have not (as is cuſtomary) been more particular in this Addreſs.

However, as I have hitherto done, I ſhall for the future endeavour to demonſtrate my ſincerity, by carefully inſtructing the Youth that ſhall come under my Care; and thereby, with the Help of Induſtry aſſiſt them in making their future Lives eaſy and honourable, as well as improving their Fortunes, which are only a few of the many Advantages that flow from Trade.

I am,

GENTLEMEN,

Your moſt
humble Servant,

HENRY GORE.

THE

Preface.

I *Have long deſign'd to publiſh a Treatiſe of* Vulgar *and* Decimal ARITHMETICK, *that would be uſeful to Men concern'd in* Trade *and* Merchandiſe; *and I thought that if I only collected the beſt Things out of* Authors *already extant, and digeſted them into a proper method and illuſtrated them with* Examples, *it could not but anſwer the*

the deſign. But when I came to reſolve upon the Undertaking, *I found that a good deal more than that was not only poſſible, but abſolutely neceſſary to be done, to render a Piece worthy of the Title I deſign'd it ſhould bear, and to procure me my Pardon for obtruding upon the Publick a new* BOOK *upon ſo old a ſubject.*

I applyed my ſelf however to the beſt Authors *I could get, and what I found in them that was for my purpoſe, I freely made uſe of, ſupplying the reſt out of ſuch Obſervations of my own, as had occurr'd to me in above 30 Years Practice.*

THE PREFACE:

'Twas my Intention at firſt to have Printed the whole in One Volume, *but for Reaſons which to me appear'd Sufficient, I rather choſe to make Two of it; ſo that what I now preſent the World with, is all the Rules in* ARITHMETICK *wrought by* Whole Numbers *only; and therefore being unwilling either to give the* Reader *or the* Preſs *more trouble than I could avoid, I've frequently omitted odd parts of* Farthings *&c. in an* Operation, *which I knew would not ariſe to any thing conſiderable.*

If this meet with Encouragement, and Life and Health be continu'd, it ſhall ſpeedily be followed

followed with a compleat Treatiſe of Vulgar *and* Decimal FRACTIONS, *where not only all theſe* Rules, *but ſeveral others ſhall be performed after a plain and compendious manner.*

I have taken a great deal of care, all along to obſerve ſuch a Medium, between too much brevity and too much prolixity, as to inform and improve the meaneſt Capacity, and leaſt knowing in Numbers, and at the ſame time to entertain thoſe of a more happy genius, and advanced knowledge in theſe Things. Above all; I have never failed to have a ſpecial Regard to the Man of Buſineſs, adapting all my Examples *to* Trade *and* Commerce.

I have nothing further to add at this Time, but that I freely ſubmit this Performance to the cenſure of proper judges, ſuch I mean as have both Skill and Candour enough to judge aright,

THE
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VULGAR ARITHMETICK Improved.

CHAP. I.

Sect. 1. *General Definitions.*

1. THE moſt Part of the Objects of our Knowledge may be conſider'd as capable of Augmentation and Diminution; and our Idea of Things, as far as they have that Capacity, is what we call Quantity. By which Word may be comprehended whatever can properly be ſaid to have parts.

Under this *Definition* we may rank *Extenſion*, *Number*, *Weight*, *Motion*, *Time*, &c. the one being taken as greater, or leſſer, heavier, or lighter, ſwifter, or ſlower, in relation to another of the ſame Kind.

And ſince the primary, and moſt conſiderable Property of Quantity, is a being capable of more or leſs; therefore Quantities may be added to, ſubtracted from, multiplied by one another, and divided into the Parts they contain.

2. The mutual Relation of two Things of the ſame Kind compared together in reſpect of Quantity, is called *Ratio*, and the Similitude of *Ratio*'s is called *Proportion*.

N. B. I ſhall call the Quotients which ariſe by dividing of two Numbers by their common Meaſure, the *Ratio* of thoſe two Numbers; and if that common Meaſure was the greateſt poſſible, thoſe Quotients will be the leaſt *Ratio* of thoſe Numbers.

3. *Common Meaſure* of two, or more Numbers, is ſuch a Number that exactly divides thoſe Numbers without a Remainder. And the greateſt *Common Meaſure* of two, or more Numbers, is the greateſt Number that can divide thoſe Numbers without a Remainder. As 4 is the greateſt *Common Meaſure* of 8 and 12; and becauſe 4 is contain'd in 8 two times, and in 12 three times. I ſay the leaſt *Ratio* of 8 to 12 is that of 2 to 3, for as 8 is to 12, ſo is 2 to 3, as will appear further on, and is evident from 15 *Prop.* 5 *Euclid.*

4. The Knowledge of theſe Compariſons of Quantities, or the Relations they have one to another, is what is generally called *Mathematicks.*

5. Quantities have their Parts, either continuous or diſcrete, *i. e.* either united or ſeparated.

And that Quantity which hath its Parts ſeparated, is called *Multitude*, and is the Subject of *Arithmetick*; but that Quantity which has its Parts united, is called *Magnitude*, and is the Subject of *Geometry*.

Arithmetick then is the Art of Numbering, or accounting by Numbers, and is one of the principal Parts of the *Mathematicks*, and which neceſſarily precedes the reſt, being converſant about diſcrete Quantity, *i. e.* (as was ſaid above) Numbers.

6. The Word Part, only denotes our Manner of conceiving a Thing, when conſidered in relation to the whole, and may be taken as an indiviſible Component of it; or as that, whoſe further Diviſibility is not enquir'd into. Hence,

Unit, is properly a Name impoſed on a Quantity, conſidered as indiviſible. And

Number is a Collection of *Units*; when thoſe *Units* are look'd upon as whole, the Number goes under the Name of an *Integer*; but if they are taken as Parts of a whole, then it is called a *Fraction*.

7. A *Vulgar Fraction* is divided into two Parts, one ſtanding above a Line called the *Numerator*, and the other ſtanding under the Line, and is called the *Denominator*: So that if we divide Unity into 12 Parts, 5 of thoſe Parts will be expreſs'd thus, $\frac{5}{2}$ $\frac{\text{Numerator,}}{\text{Denominator}}$. And this is properly a Vulgar, or Common Fragment, or Part of an *Unit*, called a *Vulgar Fraction*.

N. B. The Reaſon why theſe are called *Numerator* and *Denominator*, or the Ways of uſing them, or any other Diſquiſition concerning the ſeveral Kinds of *Fractions*, as *Vulgar*, *Decimal*, &c. being no material Part of this Treatiſe, ſhall not be inſiſted on in this Place.

8. A Number is ſaid to be an Aliquot Part of another, when the firſt preciſely meaſures the other. So

6 is an Aliquot Part of 18, and 7 of 28; for 6 meaſures 18 by 3, and 7 meaſures 28 by 4.

9. One Number is ſaid to be Prime to another, when no Number can be found to meaſure both preciſely, excepting *Unity.* So 11 and 15 are Prime to one another; ſo are 13 and 36, and many more.

10. One Number is compoſite to another, when a Number can be found that meaſures both exactly beſides *Unity.* Such are 12 and 36, 15 and 75, ſince 3 meaſures the firſt Pair, and 5 the ſecond; and ſo many more.

* * *

Sect. 2. *Numeration.*

I. BY *Numeration* we know how to place or give a juſt Value to any Number propoſed: And to that End it is to be obſerved, that all Numbers whatſoever are to be expreſs'd by, or compos'd of theſe Ten Figures or Characters, *viz.*

One,	Two,	Three,	Four,	Five,	Six,
1	2	3	4	5	6
	Seven,	Eight,	Nine,	Cypher,	
	7	8	9	0.	

II. The Species or Kinds of whole Numbers are three; 1*ſt*, Digits, 2*dly*, Articles, 3*dly*, Mix'd Numbers.

1. A *Digit* is any of the Nine foregoing Figures ſingly expreſs'd; as 1, 2, 3, *&c.* which poſſeſſes but one Place or Degree.

2. An *Article* is any one or more of the Nine *Digits*, with a *Cypher*, or *Cyphers*, following it on the Right-Hand; as 10, 100, 300, 4000, *&c.*

3. A mix'd Number is compos'd of *Digits*, or *Cyphers* and *Digits*, promiſcuouſly placed together; as 12, 14, 140, 200, *&c.*

Every one of the Nine *Digits* have two Values, certain and uncertain.

The certain Value depends upon, and is known by its Form or Character; as Four is 4, *&c.* the other uncertain, by the Place it poſſeſſeth, when join'd with other Figures.

The Value of a Figure may be ſaid to be certain when it ſtands alone, without any Figure or Cypher annexed to it; or if it ſtands in the firſt Place, or Place of *Units* in a Number, for, then it never ſignifies more than its own ſimple Value; as 2 is Two, 6 is only Six.

The Value of a Figure may be ſaid to be uncertain with reſpect to the Place it ſtandeth in: So any of the Nine Figures, in the Place of *Units*, ſignifies but its own ſimple Value (as was ſaid before;) but in the ſecond Place it is to be accounted ſo many Tens, as it contains *Units*, or ten times its ſimple Value: So 5 in the firſt Place is but 5; but in the ſecond Place it ſignifies ſo many Tens, *i. e.* 50. So that 5 may ſtand for 5, Fifty, 5 Hundred, *&c.* and 7 may ſtand for 7, Seventy, 7 Hundred, 7 Thouſand, *&c.*

For your better underſtanding the foregoing Directions, and better reading any Number, I have inſerted the following Table.

The Numeration TABLE.

Hundreds of Millions.	Tens of Millions,	Millions,	Hund. of Thouſ.	Tens of Thouſ.	Thouſands,	Hundreds,	Tens,	Units,
								1
							2	1
						3	2	1
					4	3	2	1
				5	4	3	2	1
			6	5	4	3	2	1
		7	6	5	4	3	2	1
	8	7	6	5	4	3	2	1
9	8	7	6	5	4	3	2	1

In the foregoing Table you may ſee how each Place exceeds the former 10 times, increaſing in Value towards the Left-Hand.

The firſt Place is the Place of *Units*, the ſecond *Tens*, the third Hundreds; and ſo on as far as you pleaſe.

The Denomination of the firſt Period, or of the firſt three Places, is Hundreds; the Denomination of the ſecond Period, or ſecond three Places, is Thouſands, of the third Millions.

The fourth Period, if the Table had been continued ſo far, would have been Thouſands of Millions; but in *Practice* we have ſeldom any Occaſion for ſo large a Number.

In reading large Numbers, it is convenient the young Learner exerciſe himſelf in the ſmalleſt Numbers firſt, and ſo proceed to the greater, 'till he be perfect.

The Value of 7654321, being the 7th Place in the Table, will be found to be in Words at length, ſeven

Millions, ſix hundred fifty-four Thouſand, three hundred and twenty-one.

And tho' the former Table goes but to 9 Places, yet it is ſufficient to find the Value of any Number, tho' it conſiſts of the greateſt Number of Places.

A ready Way in large Numbers, is by pointing them thus: Begin at *Units*, ſet a Point or a Figure of 1 over the 7th Place; then reckoning that Place as one, count forwards, ſet two Points or a Figure of 2 over the next 7th Place; and ſo continue to the End.

Then the	1ſt,	Point from *Unit* ſtands over	Millions,
	2d,		Billions,
	3d,		Trillions,
	4th, *&c.*		Quadrillions, *&c.*

As is evident from the following *Example*;

Quadrillions or Millions 4 times Repeated.	Trillions or Millions 3. times Repeated.	Billions or Millions twice Repeated.	Millions.
4	3	2	1

1327,16271,631127,163471,6271276

By this Means you may read any Number, tho' it conſiſts of the greateſt Number of Places, as eaſily as one of the ſmalleſt Number.

Sect. 3.

Sect. 3. *Addition.*

DEFINITION.

ADdition is the putting together, or Collection of two or more Numbers into one Sum, or Total.

General Rule of ADDITION.

Set down all the Numbers to be added, as in the *Examples* under-written, wherein, obſerve to ſet no Figure in the ſame Column, but what are of the ſame ſecondary Value, or Place. Then beginning at the Place of *Units* of the loweſt Rank, add up all that Column, and under it (in the Sum) place the Total, if leſs than 10, but if equal to, or above 10, place the Exceſs above 10, or any Number of Tens; and if there is no Exceſs, ſet down a Cypher or 0, and for each 10 add 1 to the next Column, which add up as you did the laſt; and go thus thro' every Place or Column: When you have ſumm'd-up the laſt, ſet the Number of Tens, found in it, upon the Left-hand of all, as the higheſt Place, and you have the Sum required.

See the following Examples.

	Example 1.	*Example* 2.
	786378	7196276
	110937	1316219
	821169	3716207
	162714	1562716
	319301	3198321
	162717	1371916
	216271	2193162
		1627211
Sum	2579487	22182028
	1793109	14985752
Proof	2579487	22182028

***** Before we proceed to the Addition of Numbers of divers Denominations, we think it proper to inſert the following Tables.**

A TABLE *of* Engliſh *Coins.*

4 Farthings	make	1 Penny,
12 Pence		1 Shilling,
20 Shillings		Pound Sterling,
6 Shillings 8 *d.*		1 Noble,
3 Nobles		1 Pound,
2 Nobles		1 Mark,
13 Shillings 4 *d.*		1 Mark,
21 Shillings		1 Guinea.

The

The firſt Example *explained.*

⁂ Firſt, beginning at the Bottom of the Right-hand Column, I ſay 1 and 7 is 8, and 1 is 9, and 4 is 13, and 9 is 22, and 7 is 29, and 8 is 37; I ſet down the 7 juſt under the Column, and carry the 3 Tens to the next Column; and beginning at the Bottom, I ſay 3 I carry and 7 is 10, and 1 is 11, and, ſkipping the 0, I ſay 11 and 1 is 12, and 6 is 18, and 3 is 21, and 7 is 28; I ſet down the 8, and the 2 Tens I carry to the next Column, and ſay 2 I carry and 2 is 4, and 7 is 11, and 3 is 14, and 7 is 21, and 1 is 22, and 9 is 31, and 3 is 34, ſo I ſet down 4 and carry 3; then going to the Bottom of the fourth Column, I ſay, 3 I carry and 6 is 9, and 2 is 11, and 9 is 20, and 2 is 22, and 1 is 23, and 6 is 29; I ſet down the 9, and carry the 2 to the next Column; then I ſay 2 and 1 is 3, and 6 is 9, and 1 is 10, and 6 is 16, and 2 is 18, and 1 is 19, and 8 is 27; I ſet down 7, and carry 2 to the Bottom of the laſt Column, and ſay 2 I carry, and 2 is 4, and 1 is 5, and 3 is 8, and 1 is 9, and 8 is 17, and 1 is 18, and 7 is 25; and here I ſet down the whole 25, becauſe there is no Column towards the Left-hand for the Tens Figure to be carried into: So the Total is 2 Millions 5 Hundred 79 Thouſand 4 Hundred Eighty and 7.

Troy Weight.

24 Grains	make	1 Penny-weight,
20 Penny-weights		1 Ounce,
12 Ounces		1 Pound.

By *Troy-Weight* are weighed Jewels, Gold, Silver, Corn, Bread, and all Sorts of Liquors.

Avoir-

AVOIRDUPOIS Weight.

16 Drams	make	1 Ounce,
16 Ounces		1 Pound,
28 Pounds		1 Quarter of a Hund^{d}.
4 Quarters		1 Hundred,
20 Hundreds		1 Tun.

APOTHECARIES Weight.

20 Grains	make	1 Scruple,
3 Scruples		1 Dram,
8 Drams		1 Ounce
12 Ounces		1 Pound.

By theſe Weights Apothecaries compound their Medicines, but buy and ſell by *Avoirdupois*.

N. B. Avoirdupois Weight is now the common Weight of *England*, by which Butter, Cheeſe, and all Groceries, *&c.* are weighed.

2. One Pound *Avoirdupois* is equal to 14 Ounces 11 Penny-weight 15 Grains and a half *Troy*; and one Ounce *Troy* is equal to 1 Ounce 1 Dram, and ſomething more *Avoirdupois*.

WOOL Weight.

7 Pounds	make	1 Clove,
2 Cloves		1 Stone,
2 Stones		1 Todd,
6 Todds and a half		1 Wey,
2 Weys		1 Sack,
12 Sacks		1 Laſt,

LEAD Weight.

19 lb. and a half makes 1 Fodder.

Of MEASURES.

WINE *Meaſure.*

2 Pints	make	1 Quart,
4 Quarts		1 Gallon,
63 Gallons		1 Hogſhead,
2 Hogſheads		1 Pipe,
2 Pipes		1 Tun.

BEER and ALE.

2 Pints	make	1 Quart,
4 Quarts		1 Gallon,
9 Gallons		1 Firkin,
2 Firkins		1 Kilderkin,
2 Kilderkins		1 Barrel,
3 Barrels		1 Butt.

N. B. 8 Gallons make 1 Firkin of Ale.

LONG *Meaſure.*

3 Barley Corns	make	1 Inch,
12 Inches		1 Foot,
3 Feet		1 Yard,
5 Yards & half		1 Pole,
40 Poles		1 Furlong,
8 Furlongs		1 Mile.

DRY *Meaſure.*

8 Pints	make	1 Gallon,
2 Gallons		1 Peck,
4 Pecks		1 Buſhel,
4 Buſhels		1 Coom,
2 Cooms		1 Quart,
5 Quarts		1 Wey,
2 Weys		1 Laſt.

L A N D Meaſure.

40 Square Perches	make	1 Rood,
4 Roods	make	1 Acre.

N. B. That a *Geometrical* Pace is 5 Feet, and that there are 1056 ſuch Paces in an *Engliſh* Mile.

C L O T H Meaſure.

4 Nails	make	1 Quarter,
4 Quarters	make	1 Yard,
5 Quarters	make	1 Ell Engliſh,
3 Quarters	make	1 Ell Flemiſh,

12 ——	make	1 Dozen,
12 Dozen	make	1 Small Groſs,
12 Small Groſs	make	1 Great Groſs.

To add Numbers of divers Denominations.

R U L E.

YOU muſt conſider how many Species there are, and their Relations, *i. e.* how many *Units* of the leſſer make 1 of the next greater. Set them down each Species together, and, ſo as the leſſer be next to the Right-hand, and the next higher gradually upon the Left. And in ſetting down each Species, obſerve the preceding Rule. The Numbers that you can ſet down under any leſſer Denomination, muſt always be leſs than the Value of an *Unit* of the next greater Denomination, otherwiſe you confound them. But the Reaſon will be plain from hence, *viz.* Begin at the loweſt Denomination, and add up all the Numbers thereof, if the Sum is leſs than an *Integer*, or the Value of an *Unit* of the next higher Denomination, ſet it down under the Denomination added; if 'tis equal to, or more than an *Unit*, or 1, or any other Number of *Units* of the ſaid higher Denomination, ſet down the Exceſs, and for each 1 of the next higher you find, add 1 to the Numbers of the ſaid higher, the Reaſon of which is obvious; and when you come to the higheſt Denomination, do with it as was directed in the laſt *Section*, becauſe there's no higher to which it can be carried.

Before I proceed to the Addition of Money, *it may not be amiſs to ſubjoin to the foregoing* Tables *a* Pence-Table, *which I would adviſe every Learner to get perfectly by Heart.*

Pence TABLE.

Pence.		*s.*	*d.*
12		1	0
20		1	8
30		2	6
40		3	4
50		4	2
60		5	0
70		5	10
80		6	8
90		7	6
100		8	4
110		9	2
120		10	0
130	is	10	10
140		11	8
150		12	6
160		13	4
170		14	2
180		15	0
190		15	10
200		16	8
210		17	6
220		18	4
230		19	2
240		20	0

Example

Examples of MONEY.

l.	*s.*	*d.*	*q.*
467	14	10	$\frac{3}{4}$
268	06	11	$\frac{1}{2}$
349	19	06	$\frac{1}{4}$
978	12	09	$\frac{3}{4}$
24	04	00	$\frac{1}{2}$
2088	18	02	$\frac{3}{4}$

l.	*s.*	*d.*	*q.*
271	16	07	$\frac{1}{2}$
129	08	11	$\frac{3}{4}$
712	15	06	$\frac{3}{4}$
411	12	07	
126	08	10	$\frac{1}{4}$
212	06	04	
1864	08	10	$\frac{1}{4}$

The firſt Example *explained.*

Firſt, I begin with the Farthings, ſaying, 2 and 3 is 5, and 1 is 6, and 2 is 8, and 3 is 11 Farthings, which is 2 Pence and 3 Farthings; I put down 3 in the Farthings place, and carry 2 Pence: Then I begin with the Pence, and ſay 2 that I carry and 9 makes 11, and 6 is 17, and 1 is 18; then I come down the Tens of Pence, and ſay, 18 and 10 is 28, and 10 makes 38 Pence, which by the Table of Pence makes 3 Shillings and 2 Pence; ſet the 2 under the Pence place, and carry the 3 Shillings to the Shillings place; and ſay, 3 I carry and 4 is 7, and 2 is 9, and 6 is 18, and 6 is 24, and 4 is 28; and then going down the Tens Row, ſaying 28 and 10 is 38, and 10 is 48, and 10 is 58 Shillings, which is 2 Pounds 18 Shillings; ſet down the 18 Shillings and carry the 2 Pounds to the *Units* place of Pounds; and ſay, 2 I carry and 4 is 6, and 8 is 14, and 9 is 23, and

8 is 31, and 7 is 38; ſet down 8 and carry 3, which I carry to the next Line; and ſay, 3 I carry and 2 is 5, and 7 is 12, and 4 is 16, and 6 is 22, and 6 is 28; ſo I ſet down 8 and carry 2 to the next Line; where I ſay, 2 I carry, and 9 is 11, and 3 is 14, and 2 is 16, and 4 is 20, which I ſet down, and 'tis done. So the Sum of all is 2088 *l.* 18 *s.* and 2 *d.* 3 Farthings.

Example 1.

Troy *Weight.*

l.	*oz.*	*dwt.*	*gr.*
416	08	15	20
842	01	10	05
26	11	04	17
22	06	19	23
1308	04	10	17

Example 2.

Avoirdupois *Weight.*

Tuns.	*C.*	*qr.*	*lb.*	*oz.*	*dr.*
147	16	03	14	15	15
119	03	01	04	01	00
7	19	03	27	10	08
1	20	02	10	13	12
276	10	03	01	09	03

Example.

Wine Meaſure.

Tun.	*Butt.*	*Hd.*	*Gal.*
31	01	01	38
10	01	00	10
05	00	01	60
07	01	01	09
55	01	00	54

Example.

Beer Meaſure.

Barr.	*Fer.*	*Gal.*
31	03	08
17	02	01
12	01	05
72	03	06
134	03	02

Example.

Of TIME.

Day.	*Ho.*	*Min.*	*Sec.*
34	12	40	48
420	05	10	20
510	23	59	50
21	10	00	11
987	03	51	09

Example.

Of DOZENS.

Gr. doz.	*Sm. gr.*	*Dr.*	*Ps.*
56	10	06	11
148	09	11	03
26	11	01	09
533	02	08	10
765	10	04	09

The Proof of ADDITION.

IT is common to prove *Addition* by firſt adding up the whole, as we did in the firſt *Example*; then ſcore off the top Line, and add up all but it; then add that Sum and top Line together, and if their Sum be equal to the Sum of all the Lines, the Work is right, otherwiſe not.

Others chooſe to prove *Addition*, by firſt adding the Columns upwards, and then downwards, and if they have the ſame Sum both Ways, the Work is right, otherwiſe wrong.

The Reaſon of the Rule.

1. Nothing can ſtand in a Column but what is of the ſame Place; for otherwiſe the Sum of them will be a Mixture of *Units* of different Value, and conſequently abſurd. For *Example*; add 30 to 4. if you add the 4 to the 3, the Sum is 7, which is neither 7 *Tens* nor *Units*, and conſequently is a *Chimera*; but add 4 to 0, and then add the 3 in

its place, the Total is 34, which is right. Since it was propoſed to add 3 *Tens* and 4 *Units* together, argue after the ſame Manner in any other Caſe.

2. The ſecond Part of the Rule is manifeſt from the Nature of *Numeration*; according to which, every 10 of the Column, or Place foregoing, makes but 1 in the Place or Column following. Now ſince all the Parts of every Thing together are equal to the whole, for they compoſe, or make it up; it is plain, the *Units* of each Column, *i. e.* of all the given Numbers, being thus collected, the Aggregate or Sum is the Thing ſought.

* * *

Sect. 4. *Subtraction.*

SUbtraction in general is taking a leſſer Number from a greater, to find the Difference between them, which Difference is commonly called the *Remainder.*

A General Rule for Subtraction.

Set down the Numbers as directed in *Addition*, and ſet the greater uppermoſt; begin at the *Units* place of the *Subtractor*, and take the Difference between it and the Figure that ſtands in the ſame place with it in the *Subtrahend*, which Difference ſet down under that Place for the Remainder; do ſo with each place to the Left-hand; but if the Figure in any place of the *Subtractor* be greater than the Correſpondent Figure in the *Subtrahend*, (the Total always being leſs) then add 10 to the deficient Figure, and ſubtract; and when you come to the next place add 1 to the *Subtractor*, and take the Sum from the correſponding *Subtrahend*; do this as often as you have occaſion to add 10; all the Differences ſet down thus, makes the total Difference or Remainder ſought.

Examples in Integers.

Subtrahend, —— 716376876
Subtractor, —— 613468742

102908134

This *Example* explain'd: Having placed the Figures, and drawn Lines, as in the *Example*, I begin with the *Units* Figure of the *Subtractor*, and take it from the *Units* Figure of the *Subtrahend*, ſaying 2 from 6, and there remains 4, which ſet down underneath; then I go to the 4, and ſay, 4 from 7 and there remains 3, which I ſet down; and ſay, 7 from 8 and there remains 1, that I ſet down; then I ſay 8 from 6 I cannot, but I borrow 10 to the 6, and it makes 16; then I take 8 from 16 and there remains 8, which I ſet down; then becauſe the 10 that I borrowed is but the Value of one 1 in the next place towards the Left-hand, as is plain from the Nature of *Numeration*; therefore I go to the 6, and ſay 1 that I borrowed and 6 is 7, which I take from 7, and there remains 0; then 4 from 3 I cannot, but I borrow 10 to the 3, which makes 13, and 4 from 13 and there remains 9, which I ſet down; then 1 that I borrowed and 3 is 4, and 4 from 6 and there remains 2, I ſet it down, and ſay 1 from 1 and there remains 0. Then *laſtly*, 6 from 7 and there remains 1, which I ſet down, and 'tis done.

More

More Examples in Integers.

7168374	27163726
6149875	19287168
1018499	7876558

Examples in Engliſh *Coin.*

	l.	s.	d.	q.	l.	s.	d.	q.
Borrowed ——	276	13	06	$\frac{1}{4}$	172	01	03	$\frac{1}{2}$
Paid part ——	186	17	08	$\frac{1}{2}$	164	16	11	$\frac{3}{4}$
Ballance owing	89	15	09	$\frac{3}{4}$	7	04	03	$\frac{3}{4}$
Proof ——	276	13	06	$\frac{1}{4}$	172	01	03	$\frac{1}{2}$

An Explanation of the firſt Example.

Firſt, I begin at the place of Farthings, and ſay, 2 Farthings from 1 I cannot, but borrow 4; then 2 from 5 and there remains 3, which I ſet under the place of Farthings; then for the 4 Farthings which I borrowed I pay 1 Penny (which is its Equivalent) to the 8 Pence in the *Subtractor*, and it makes 9 Pence; then 9 Pence from 6 Pence I cannot, but I borrow 12 Pence to the 6, and it makes 18 Pence; then 9 from 18 and there remains 9, which I ſet down under the Pence, and proceed to the Shillings, ſaying, 1 Shilling that I borrowed to the Pence and 17 makes 18, which I ſhould take from 13, but cannot; therefore I borrow 20 to the 13, which makes 33; then 18 from 33 and there remains 15 Shillings, which I ſet down under the Shillings, and proceed to the Pounds, ſaying 1 Pound which I borrowed at the Shillings and 6 is 7; then 7 from 6 I cannot, but 7 from 16 and there remains 9, which I ſet down; then 1 I borrowed and 8 is 9, which I ſhould take from 7, but cannot, ſo I borrow 10 to the 7, which makes 17, from which I take 9, and there remains 8, which I ſet down; then 1 I borrowed and 1 is 2, which taken from 2, and there remains 0, and 'tis done: So the Ballance is 89 *l.* 15 *s.* 9 *d.* 3 Farthings.

N. B. It were the ſame thing (but ſomething eaſier) if inſtead of adding that which I borrow to the Figure in the *Subtrahend*, and taking the Figure in the *Subtractor* from that Sum, I had taken the Figure in the *Subtractor* from that which I borrowed, and added the Remainder to the Figure in the *Subtrahend*, as ſhall be done in the Explanation of the firſt following Example.

Examples in Troy Weight.

	Example.					*Example.*			
	l.	*oz.*	*dwt.*	*gr.*		*l.*	*oz.*	*dwt.*	*gr.*
Bought	96	07	12	07		112	04	07	14
Sold out	78	10	13	12		108	08	17	18
Unſold	17	08	18	19		3	07	09	20
Proof	96	07	12	07		112	04	07	14

Firſt,

Firſt Example explain'd.

Firſt, I go to the *gr.* and ſay, 12 from 7 I cannot, but borrow 24, and 12 taken from 24 and there remains 12, which I add to the 7 in the *Subtrahend*, it makes 19 *gr.* which I ſet down under the *gr.* then 1 *dwt.* that I borrowed and 13 is 14, 14 from 12 I cannot, but 14 from 20 I borrow, and there remains 6, which I add to 12, makes 18 *dwt.* to ſet down, then 1 *oz.* which I borrowed and 10 is 11 *oz.* 11 from 7 I cannot, but 11 from 12 that I borrow and there remains 1, which I add to 7 makes 8 to ſet down; then 1 I borrowed and 8 is 9; 9 from 6 I cannot, but 9 from 10 which I borrow and there remains 1, which added to the 6 makes 7 to ſet down. *Laſtly*, 1 that I borrowed and 7 is 8, 8 from 9 and there remains 1, which I ſet down, and 'tis done.

Examples of Avoirdupois Weight.

	Example 1.			*Example* 2.				
	lb.	*oz.*	*dr.*	*Tuns.*	*C.*	*lb.*	*oz.*	*dr.*
Bought ——	256	13	12	21	12	11	11	03
Sold out	188	14	13	16	18	24	12	11
Ball. unſold	67	14	15	4	13	14	14	08
Proof ——	256	13	12	21	12	11	11	03

Examples

Examples in Long Meaſure.

Example 1.

Mil.	*Fur.*	*Pol.*	*Yds.*
24	05	28	03
16	07	32	04
07	05	35	04 $\frac{1}{2}$
24	05	28	03

Example 2.

Yds.	*Feet.*	*Inch.*	*B.C.*
12	01	01	00
10	02	10	02
01	01	02	01
12	01	01	00

Proof of Subtraction.

For Proof of this Rule we add the *Remainder* and *Subtractor* together, and if their Sum be the ſame with the *Subtrahend* it is right, otherwiſe wrong.

The Reaſon of this Rule is evident, for ſince the *Remainder* is the Difference of the *Subtractor* and *Subtrahend*, or the Exceſs of the *Subtrahend* above the *Subtractor*, that Difference or Exceſs added to the *Subtractor*, which is the leſſer Number, muſt make the *Subtrahend*, which is the greater, from that well known *Axiom*, that every whole is equal to all its Parts.

It plainly followeth from the Nature of *Addition* and *Subtraction*.

1. That *Addition* alone finds the Sum Total of many particular Sums; and it it be applied to a Man's Account, it ſheweth in what Sum he is Debtor or Creditor.

Example.

E X A M P L E.

I am indebted to ſeveral Perſons as followeth, *viz.*

	l.	*s.*	*d.*
To John Long, *for Cotton Wool*	62	16	09
To Timothy Quill, *for Sugar*	12	11	11
To Henry Oldhouſe, *for Rent*	26	12	08
To William Holmbe, *for Yarn*	112	06	06
To Ralph Shaw, *for Wine* ——	41	11	10
In all	255	19	08

Or if it be applied to the Inventory of a Man's Eſtate, it ſheweth in groſs what he is worth, or what he oweth.

E X A M P L E.

June the 14th, 1733. An *Inventory* taken this Day of the whole Eſtate of me *A. B.* of *Mancheſter*, in Money, Wares, and Debts owing to me, as followeth, *viz.*

	l.	*s.*	*d.*
Imprimis, I have Caſh in Hand	26	16	04
Item, I have 34 Cotton Ends, valued at ————	12	12	10
Item, I have 16 Pieces of Canvaſs, valued at ————	35	09	11
John Snap oweth me by his Note, due the 12th of *Auguſt* next	41	11	09
Item, *James Truſt*, for 1 Year's Rent, due on *Monday* next	16	16	10
In all	133	07	08

2. *Subtraction*

([illegible])

[illegible]

[illegible]

Twenty Cents, D.

l.	s.	d.			
[illegible]	18	[illegible]	To Cash [illegible]	[illegible]	[illegible]
[illegible]	18	10	[illegible]		
[illegible]	08	[illegible]	[illegible] Cash All[illegible]	[illegible]	[illegible]
09	10	06	To unaccepted Allowances for an Allowance [illegible] D. [illegible]	21	[illegible]
1	18	[illegible]	To Cash paid [illegible]	8	[illegible]
[illegible]	09	[illegible]	Total		

2. *Subtraction* alone, only finds the Difference between any two Numbers, or Sums of Money; and if it be applied either to an Account of Money, or Goods, that Difference is called the *Ballance* of the Account, and theſe Sums may be either original, or ſimple Sums, or they may be the Aggregates of ſeveral Sums, collected by *Addition.*

An Example of a Leidger *Account.*

Timothy Curl, Dr.

1733,			*l.*	*s.*	*d.*
April	2	To Caſh paid him ——	16	18	05
	12 - -	To *A. B.* for my Bill on him ——	08	12	10
May	9 - -	To *Holland* Cloth ſold him —— ——	27	08	04
	21 - - - -	To accepted Aſſignations for an Aſſignation on *C. D.* in *Mancheſter*	09	10	06
June	8	To Caſh paid him ——	12	18	04
		Total	75	08	05

If they be ſimple Sums, the Examples already given in *Subtraction* are ſufficient.

If they be the Aggregates of ſeveral Sums, then the leſſer muſt be taken from the greater, as before, and the Remainder will be the *Ballance*.

An Example of a Leidger *Account.*

Contra, C^{r}.

1733,			*l.*	*s.*	*d.*
April	1	By Broad Cloth bought	16	11	08
	17	By Callicoes bought of him	21	08	06
	27	By Caſh paid me ——	12	06	04
May	9	By a Note on *E. F.* of *Leigh* ——	08	14	10
	18	By Sundries, as *per* Memorial ——	09	12	08
June	2	By Serge bought of him	06	09	10
	14	By Ballance due to me	00	04	07
		Total	75	08	05

Sect. 4. *Multiplication.*

DEFINITIONS.

1. *MUltiplication* is the taking any Number a certain Number of Times, or finding a Number which ſhall contain any given Number a certain propoſed Number of Times, *i. e.* as often as that other Number contains *Unity.*

2. The Number to be multiplied is called the *Multiplicand*, the Number by which it is multiplied, (or the Number of Times it is to be taken) is called the *Multiplier*; and the Number found is called the *Product*: The *Multiplicand* and *Multiplier* are alſo called the Factors of the *Multiplication* (without Diſtinction) becauſe they make the Product or Number ſought.

From the *Definition* above we may infer, that in *Multiplication*, the following Analogy muſt always hold, *viz.*

As an *Unit* or 1 is in Proportion to one of the Factors *E. G.* to the *Multiplier*, ſo is the other Factor, *i. e.* the *Multiplicand* to the *Product.*

Before we can proceed to the Operations in *Multiplication*, the following *Table* muſt be learn'd by Heart.

Multiplication TABLE.

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81

The Uſe of the preceding TABLE.

The Uſe of this Table is to find the Product of any of the nine *Digits*, multiplied, either by itſelf, or any of the other *Digits*; and is thus performed. Find one of the Numbers, it matters not, whether in the Column next the Left-hand, and follow that Space till you come under the other Number at the Top of the Table, and in the Angle of meeting is the Product of thoſe two Numbers.

EXAMPLE.

Suppoſe I would multiply 7 by 4, or (which is the ſame thing) 4 by 7. *Firſt*, I ſeek either the 7 or 4; as ſuppoſe 7 in the Left-hand Column, and going along that Space till I come under the 4 at Top, I find in the Angle of meeting 28, which is the Product of 7, multiplied by 4, or 4 multiplied by 7. It had been the ſame thing if I had found the 4 on the Left-hand, and 7 at the Top, for in that Angle of meeting you will have 28. Do ſo for any other *Digits.*

A General Rule for Multiplication.

MAKE either of the given *Factors* the *Multiplier*, and the other the *Multiplicand*; but it is generally moſt convenient to make that the *Multiplier* which hath feweſt ſignificant Figures in it; and place the firſt ſignificant Figure on the Right-hand of the *Multiplier*, under the firſt ſignificant Figure on the Right-hand of the *Multiplicand*; then beginning with the *Units* Figure, multiply every Figure of the *Multiplicand* by every Figure of the *Multiplier* ſeverally, and when any Product is leſs than 10, ſet it down under its reſpective Figure in the *Multiplicand*; but if it exceed any Number of Tens, ſet down the Exceſs, and for every 10 bear 1 in your Mind, and when you multiply the next Figure in the *Multiplicand*; add thoſe which you bear in Mind to the Product. Do thus with every Figure in the *Multiplicand*; and when you multiply the laſt Figure, ſet down your Tens, becauſe you have no Place to carry them to. After this Manner multiply the whole *Multiplicand* by every one of the Figures in the *Multiplier*, one after another, carefully obſerving to begin every Product under the multiplying Figure; then add all theſe particular Products together, as in Addition of *Integers*, and that Sum will be the Product requir'd.

The Reaſon of placing the firſt Figure of every particular Product under the multiplying Figure, is evident from the Nature of *Numeration*; if it be conſider'd, ſider'd, that as we begin with the *Units* Figure of the *Multiplier*, the ſame, or any of the Figures ſtanding in the Tens Place, muſt produce a Number ten times as big as if it ſtood in the Place of *Units*; and if it ſtood in the Hundreds Place, the Product would be an hundred times as big; and ſo on for all the other Figures in the *Multiplier*: But there is no way to make thoſe Products to bear thoſe Values, but by placing the firſt Figure of each Produce under that Figure of the firſt Product, which is the ſame Diſtance from *Unity* that your multiplying Figure is.

	Example 1.	*Example* 2.
Multiplicand	462762	9207162
Multiplier	6	9
Product ——	2776572	82864458

The firſt Example explained.

Having placed my Figures as directed in the *Rule*, I begin with the firſt Figure of the *Multiplicand*, ſaying, 6 times 2 is 12, I ſet down the Exceſs above 10, *viz.* 2 under the *Multiplier*, and for the 10 I carry 1 in my Mind, and ſay, 6 times 6 is 36, and 1 I carry in my Mind is 37; I ſet down the 7 and carry 3 for the 3 Tens; then 6 times 7 is 42, and 3 make 45; I ſet down 5 and carry 4; then 6 times 2 is 12, and 4 I carry is 16; I ſet down 6 and carry 1; then 6 times 6 is 36, and 1 I carry is 37; I ſet down 7 and carry 3. *Laſtly*, 6 times 4 is 24, and 3 I carried is 27, which ſet down, and 'tis done.

Example 3.	*Example* 4.
762768	726876
426	4208
4576608	5815008
1525536	1453752
3051072	2907504
324939168	3058694208

If either, or both the Factors have Cyphers on the Right-hand, place the ſignificant Figures of each as is directed in the *Rule*, and omit the Cyphers, till the *Multiplication* with the other Figures is finiſhed; then place ſo many Cyphers on the Right-hand of the Product as there are Cyphers on the Right-hand of both the Factors, and 'tis done.

Example 5.	*Example* 6.
726873	61729000
2427000	327200
5088111	123458
1453746	432103
2907492	123458
1453746	185187
1764120771000	20197728800000

The

The Proof of Multiplication.

IT is uſual with ſome to prove *Multiplication* by adding up the Figures in the *Multiplicand*, as in Addition of *Integers*, throwing away 9 as often as they ariſe to 9, and carrying the Remainder forward to make Part of another 9; proceeding on this Manner to the End, and what remains at laſt above 9, they ſet on one Side of a Croſs; they do ſo with the *Multiplier*, and ſet the Remainder on the other Side the Croſs; then they multiply theſe two Figures together, and throw the 9's out of that Produce, and ſet the Remainder on the Top of the Croſs; then they throw all the 9's out of the Produce of the *Multiplication*, and if the Remainder be the ſame with that which ſtandeth at Top of the Croſs, the Work is ſuppoſed to be rightly performed, elſe not.

This Rule is applied to the fourth Example.

Firſt, I begin at the *Multiplicand*, ſaying 7 and 2 is 9; throw away 9, and there remains nothing; then 6 and 8 is 14; throw away 9, and there remains 5, which I carry to the 7; and ſay, 5 and 7 is 12, throw away 9, and there remains 3; then 3 and 6 is 9, which I throw away, and there remains 0, which I ſet on the left Side of the Croſs. Then I go to the Left-hand of the *Multiplier*, and ſay, 4 and 2 is 6, and 8 is 14, out of which I throw 9, and there remains 5, which I ſet on the Right Side of the Croſs; then I ſay, no time 5 is nothing, ſo I ſet a Cypher at Top of the Croſs; then beginning at the Left-hand of the Product, I ſay, 3 and 5 is

0
0 X 5
0

5 is 8, and 8 is 16, throw away 9, and there remains 7; then 7 and 6 is 13, throw away 9, and there remains 4; then 4 and 4 (for I skip the 9) is 8, and 2 is 10, throw away 9, and there remains 1. *Laſtly*, 1 and 8 is 9, which I throw away, and there remains nothing, ſo I ſet a Cypher at the Bottom of the Croſs; which becauſe it is the ſame with the Top, I conclude the Work to be right.

I am not ignorant how far this Rule for proving *Multiplication* is from being infallible; but if it were conſiſtent with my Deſign, it were eaſy to prove that it is not ſo fallible as not to deſerve to be known; for tho' an Opertion that is falſe may (though rarely) prove true by this Rule, yet an Operation that is true can never prove falſe by it.

Some prove *Multiplication* by itſelf; thus they make that which was the *Multiplier* before the *Multiplicand*, now; and that which was the *Multiplicand* then, the *Multiplier* now; multiply as uſual, and if the Product be the ſame with the other, it is right, otherwiſe wrong.

Let it be required to prove the 4th Example.

See the Operation.

```
      4208
    726876
----------
     25248
    29456
   33664
  25248
  8416
29456
----------
3058694208
----------
```

Which Product being the ſame with that in the *Example*, makes the Truth of the Work unqueſtionable.

The only Proof of *Multiplication* is by *Diviſion*; but that not being yet learned, we ſhall not inſiſt on it here.

* * *

Sect. 5. Diviſion.

DIVISION of Numbers is only a compendious *Subtraction*; for ſince the *Diviſor*, or *Number* by which we divide, is ſo many times contain'd in the *Dividend*, or Number to be divided, as there are *Units* in the Quotient; therefore continually ſubtracting the *Diviſor* from the *Dividend*, and accounting an *Unit* for each Time you ſubtract, the Sum of thoſe *Units* will be the Quotient.

In *Diviſion* this Analogy always holds.

As the *Diviſor* is in Proportion to an *Unit*, ſo is the *Dividend* to the *Quotient*.

A General Rule for DIVISION.

Firſt, Write down your *Dividend*, making a crooked Line at each End thereof; that on the Left-hand to contain the *Diviſor*, and that on the Right for the Quotient; and having placed your *Diviſor* in its Place, diſtinguiſh with a Point ſo many Places of your *Dividend* towards the Left-hand, as will contain the *Diviſor* once at leaſt; and asking how often your *Diviſor* is contain'd in the ſaid Sum, the Anſwer muſt be placed in the Quotient; then multiply the *Diviſor* by the Figure laſt placed in the *Quotient*, ſetting your Product under your aforeſaid diſtinguiſhed Sum; and drawing a Line under both, take the lower from the higher, and to the Remainder Point, and bring down your next Figure of the *Dividend*, with which proceed as you did with your diſtinguiſhed Number, and ſo on, till you have brought down all the Figures of your *Dividend:* And Note, That as many Points as you have made under your *Dividend*, ſo many Places there will be in the *Quotient*; all which will be made more plain by the following *Examples*.

EXAMPLE I.

This Operation explain'd.

```
6)97416(16236
  .....
  6
  --
  37
  36
  --
   14
   12
   --
    21
    18
    --
     36
     36
     --
      0
```

Having placed the *Diviſor* and *Dividend* according to the foregoing Directions, *viz.* 9, will contain my *Diviſor*, I ask how often 6 is contained in 9, the Anſwer is once; therefore I put a 1 in the *Quotient*, and multiply the *Diviſor* thereby, ſaying, 6 times 1 is 6; this I place under the 9, and draw a Line, and ſubtract 6 from 9, and there remains 3; then I point under the 7, and write it on the Right-hand of the Remainder, it makes 37 for a new *Dividual*; then I ſay how often 6 in 37, the Anſwer is 6 times; ſo I put 6 in the *Quotient*, and multiply, ſaying, 6 times 6 is 36, which I place under 37, and ſubtract, and there remains 1; then pointing under 4, I bring it down to the Right-hand of the Remainder, it makes 14; then I ſay, 6 in 14 is 2 times, ſo I ſet 2 in the *Quotient*, and by it I multiply the *Diviſor*, ſaying, 2 times 6, or 6 times 2 is 12, to be ſet under 14, which I take from 14, and there remains 2; then pointing under the 1 in the *Dividend*, I write it at the Right-hand the 2, which makes 21 for a new *Dividual*: then I ſay, how often 6 in 21, is 3 times, I put 3 in the *Quotient*, and multiply that into the *Diviſor*, ſaying, 6 times 3 is 18; this I ſet under the *Dividual* 21, and ſubtract, there remains 3; then, *laſtly*, I point under 6, and write it on the Right-hand the 3, and it makes 36; then I ſay, 6 in 36 is 6 times, ſo I ſet 6 in the *Quotient*; then 6 times 6 is 36, which I place under 36, and ſubtract, there remains nothing ſo I ſet down a Cypher; and becauſe there are no more Figures to bring down from the *Dividend*, the *Diviſion* is ended, and the *Quotient* is 16236.

EXAMPLE II.

The Numbers being placed, I ask how often 642 in 2762 (for the *Diviſor* will not be contain'd in 276) or rather how often the firſt Figures of the *Diviſor* 2 is contain'd in 27, two of the firſt Figures of the *Dividual* (becauſe there is one Figure more in the *Dividual* than there is in the *Diviſor*) which is 4 times; and upon Trial I find that the whole *Diviſor* will go 4 times in the whole *Dividual*, ſo I put 4 in the *Quotient*, and multiply it into the *Diviſor*, and it makes 2568.

```
642) 2762634 (4303
     ....
     2568
     ————
      1946
      1929
      ————
        2034
        1926
        ————
         108 Rem.
        ————
```

This I ſubtract from the *Dividual*, and there remains 194; then I put a Point under 6 in the *Dividend*, and place it on the Right-hand of the Remainder, it makes 1946 for a new *Dividual*; then I aſk how often 6 is contain'd in 19, which is 3 times; and finding upon Trial that the whole *Diviſor* will go ſo often, I put 3 in the *Quotient*, and multiply and ſubtract as before directed, and there remains 20, ſo that I bring down the 3, and it makes 203 for a *Dividual*; but ſeeing that it is leſs than the *Diviſor*, I put a Cypher in the *Quotient*, and bring down the 4, which makes 2034, ſo I aſk how often 6 in 20 is? 3 times, and find the *Diviſor* will be contain'd ſo often in the *Dividual*, I put 3 in the *Quotient*, and multiply and ſubtract, and there reſts 108 for a Remainder, and the *Diviſion* is finiſhed.

Proof of DIVISION.

RULE.

Multiply the *Quotient* by the *Diviſor*, or the *Diviſor* by the *Quotient*, and to that Product add the Remainder of the *Diviſion*, (if there is any) and that Product will be the ſame with the *Dividend*, if the Work be rightly performed. Here followeth the Proof of the laſt Example.

Quotient ——	4303
Diviſor ——	642
	8606
	17212
	25818
Remainder	108
Dividend	2762634

Example.

EXAMPLE III.

46276)968763456(20934

92552

432434
416484

159505
138828

206776
185104

21672

The ſhort ITALIAN Way of DIVISION.

THIS Way of *Diviſion* differeth from the former, only in this, *viz.* that in the former Way we ſet down the Product of the *Diviſor* into the *Quotient* Figure under the *Dividual*, and ſo ſubtract that Product from the *Dividual*, as the Figures ſtand; but in this we do not ſet down the ſaid Product, but multiply and ſubſtract together in the Mind only, and ſo (with ſcarce any more Trouble to the Memory) we ſave one half of the Figures in the Operation. And therefore upon the whole, this Way ſeems to me to be (by a good deal) preferable to the other, and is what I ſhall uſe throughout this Treatiſe.

EXAMPLE 4.

7682)16837234(2191
        ....

14732

70503

13654

5972

Here I ſeek how often I can have 7 in 16, my Point being under the 7 for the *Dividual*, and I find I can have it 2 times, therefore I put 2 in the *Quotient*, and multiply the *Diviſor* by it, ſaying 2 times 2 is 4, 4 from 7 and there remains 3, which I ſet down under a Line; then 2 times 8 is 16, 16 from 3 I cannot, but borrow 20, and 16 from 23 and there remains 7, which I ſet down and carry 2; then 2 times 6 is 12, and 2 I carry is 14, 14 from 8 I cannot, but 14 from 18 and there remains 4; this I ſet down and carry 1; then 2 times 7 is 14, and 1 is 15, which taken from 16, there remains 1, which I ſet down: So the Remainder is 1473. This done, I put a Point under the 2, and write it on the Right-hand of the Remainder, and it makes 14732 for my new *Dividual*. Then I aſk how often I can have 7 in 14, which is 2 times; but trying with 2, I find it to be too much, therefore I put 1 in the *Quotient*, and proceed with it as I did before with the 2, doing ſo as often as I have any Figures in the *Dividend* to bring down.

EXAMPLE 5.

362,000) 79627627,656 (219965
722
3607
3496
2382
2107
297656 Remainder.

N. B. If the *Diviſor* have Cyphers to the Right-hand, cut them off, and as many Figures from the Right-hand of the *Dividend*, and bring down thoſe that are cut off from the *Dividend* to the Right-hand of the laſt Remainder.

COMPENDIUMS *in* Multiplication.

IN order to a more convenient handling this moſt Excellent Rule, I will conſider it under the following VARIETIES.

VARIETY I.

When your *Multiplier* is any Number between 10 and 20.

RULE.

Multiply each Figure in the *Multiplicand* by the *Units* Figure in the *Multiplier*, adding to each Product its own back Figure; and to the laſt Figure add the Tens you carry, if you carry any.

Example 1.	*Example* 2.
432725	719683
12	14
5192700	10075562

The firſt *Example* is thus perform'd, *viz.* 2 times 5 is 10, ſet down 0 and carry 1; 2 times 2 is 4, and 1 I carry is 5, and 5 the back Figure is 10, ſet down 0 and carry 1; 2 times 7 is 14, and 1 I carry is 15, and the back Figure 2 is 17, ſet down 7 and carry 1; then 2 times 2 is 4, and 1 I carry is 5, and 7 is 12, ſet down 2 and carry 1; then 2 times 3 is 6, and 1 I carry is 7, and 2 is 9, ſet down 9 and carry 0; and 2 times 4 is 8, and the back Figure 3 is 11, ſet down 1 and carry 1, which I add to the 4 makes 15, which I ſet down, and 'tis done. Do ſo for the other *Examples.*

Example 3.	*Example* 4.
7627682	627346
16	19
122042912	11919574

VARIETY 2.

If the *Multiplier* be any Number between 20 and 30.

RULE.

Multiply by the *Units* Figure of the *Multiplier*, as in the laſt; and for the 2 that ſtands in the Tens

Place, take in the back Figure twice, and add the Tens you carry at laſt to the laſt Figure double.

Example 1.	*Example* 2.	*Example* 3.
36427	73627	24362
23	26	29
837821	1914302	706498

The firſt *Example* is thus perform'd, *viz.* 3 times 7 is 21, ſet down 1 and carry 2; 3 times 2 is 6, and 2 is 8, and 7 taken twice, is 22, ſet down 2 and carry 2; 3 times 4 is 12, and 2 I carry is 14, and 2 taken twice is 18, ſet down 8 and carry 1; then 3 times 6 is 18, and 1 is 19, and 4 taken twice is 27, ſet down 7 and carry 2; 3 times 3 is 9, and 2 I carry is 11, and 6 taken twice is 23, ſet down 3 and carry 2. *Laſtly*, 2 I carry, added to twice 3 is 8, which ſet down, and all is done.

VARIETY 3.

If the *Multiplier* be any compoſit Number, *i. e.* the Product of the *Multiplication* of two Numbers.

RULE.

Multiply the given *Multiplicand* by one of the component Parts (it matters not which firſt) according to common *Multiplication*, and you will have a Product; and multiply that Product by the other Part, and that Product will be the Anſwer.

Example 1.

76342 by 36.
6
458052
6
2748312

Example 2.

571342 by 42.
6
3428052
7
23996364

Example 3.

319627 by 56.
7
2237389
8
17899112

Example 4.

42376 by 72.
9
381384
8
3051072

N. B. The Operations are too plain to ſtand in need of an Explanation.

VARIETY 4.

If your *Multiplier* either exceed, or fall ſhort of the next Tens, by one tenth Part of thoſe next Tens.

RULE.

Multiply your *Multiplicand* by thoſe next Tens, ſetting down the Product; then ſet down the ſaid Product again under itſelf, ſo many Places from *Unity* as the multiplying Figure ſtands; and if your *Multiplier* exceeded thoſe Tens, the Sum, otherwiſe the Difference of thoſe Lines, is the Anſwer.

Or thus; Having multiplied as already directed, if the *Multiplier* exceeded the Tens, add, otherwiſe ſubtract that Product to, or from itſelf, adding to, or ſubtracting *Units* from Tens, Tens to, or from Hundreds, *&c.* and the Sum or Remainder is the Anſwer.

EXAMPLES.

Multiply —— 3792 by 33, or 27.
30

113760
11376

$$\begin{array}{lr} \text{Sum} & 125136 \\ \text{Difference} & 102384 \end{array} \Bigg\} \text{Product for} \Bigg\{ \begin{array}{l} 33. \\ 27. \end{array}$$

Here, becauſe 33 exceeds 30, and 27 falls ſhort of 30, by 3, which is 1 Tenth Part of 30, I therefore multiply by 30, ſetting down the Product twice, the latter time, one Place towards the Right-hand, and the Sum of thoſe two is the Product for 33, and their Difference for 27.

Multiply —— 24362 by 88, or 72.
80

1948960
194896

$$\begin{array}{lr} \text{Sum} & 2143856 \\ \text{Difference} & 1754064 \end{array} \Bigg\} \text{Product for} \Bigg\{ \begin{array}{l} 88. \\ 72. \end{array}$$

VARI-

VARIETY 5.

If your *Multiplier* either exceeds, or falls ſhort of the next Tens, Hundreds, Thouſands, &c. by an Unit.

RULE.

Multiply your *Multiplicand* by the neareſt Tens, Hundreds, &c. and if your *Multiplier* exceed thoſe Tens, Hundreds, &c. the Sum, otherwiſe the Difference of that Product, and the *Multiplicand* is the Anſwer.

EXAMPLES.

Multiply 76543 by 51, or 49.
3827150

Sum —— 3903693 } Product for { 51.
Difference 3750607 } Product for { 49.

Here I multiplied by 50, but to avoid Confuſion, I omitted to ſet it down; then I added the *Multiplicand* to that Product for 51, and ſubtracted the *Multiplicand* from that Product for 49.

Multiply 62476 by 1001, or 999.
62476000

Sum —— 62538476 } Product for { 1001.
Difference 62413524 } Product for { 999.

Multiply 262627 by 40001, or 3999.
1050508

Sum 10505342627 } Product for { 40001.
Difference 10504817373 } { 39999.

VARIETY 6.

If the *Multiplier* be either an Aliquot Part of 100,1000, *&c.* or the Sum, or Difference of the ſaid Aliquot Part, and 100,1000, *&c.*

RULE.

If the *Multiplier* be an Aliquot Part of 100, add two Cyphers; if of 1000, add three, *&c.* to the *Multiplicand*, and divide the *Multiplicand*, ſo encreaſed, by the *Denominator* of ſuch Part. And if the *Multiplier* be only an Aliquot Part, the *Quotient* is the Anſwer: If it be the Sum of the Aliquot Part, and 100,1000, *&c.* add, if the Difference thereof ſubtract, that *Quotient* to, or from the *Multiplicand* ſo encreaſed, and the Sum or Remainder is the Anſwer.

EXAMPLES.

Multiply 3746 by 25, 75, and 125.
4) 374600

93650 } Product for { 25.
Difference 280950 } { 75.
Sum —— 468250 } { 125.

Having annexed two Cyphers to the Right-hand of the *Multiplicand*, I divide by 4, becauſe 25 is 1 4th of 100, and the *Quotient* is the Product for 25; then, becauſe 75 is 100, wanting 1 4th, I ſubtract the *Quotient* from the *Multiplicand*, and the Remainder is the Product for 75; alſo becauſe 125 is 100, made more by that Aliquot Part, *viz.* 25, I add the ſaid *Quotient* to the *Multiplicand*, and the Sum is the Product for 125.

Multiply 71963 by 125, 875, and 1125.

$$\begin{array}{lr} & 8)71963000 \\ \hline & 8995375 \\ \hline \text{Difference} & 62967625 \\ \hline \text{Sum} \text{ ——} & 81958375 \end{array}\left.\vphantom{\begin{array}{l}1\\1\\1\\1\end{array}}\right\} \text{Product for} \left\{\begin{array}{r}125.\\875.\\1125.\end{array}\right.$$

Here, becauſe 125 is 1 8th Part of 1000, I take 1 8th of the *Multiplicand* for the Product by 125, then I ſubtract that *Quotient* from the *Multiplicand* for the Product, by 875, and add the ſaid *Quotient* to the *Multiplicand* for the Product, by 1125.

VARIETY 7.

If the *Units* Figure of the *Multiplier* be any Aliquot Part of the other Figures of the *Multiplier*.

RULE.

Multiply the *Multiplicand* by the *Units* Figure of the *Multiplier*, and multiply that Product by the *Denominator* of ſuch Aliquot Part, ſetting that Product under other, one Place nearer the Left-hand, and the Sum of thoſe two Products is the Anſwer.

Example 1.
3762 by 279
9
33858
101574
1049598

Example 2.
4716 by 486
6
28296
226368
2291976

In the firſt *Example* the *Units* Figure of the *Multiplier*, viz. 9 is 1 3d Part of the other Figures, for 9 is contain'd in 27 3 times; therefore I multiply the *Multiplicand* by 9, and that Product by 3, the Denominator of the Part, ſetting the Product one Place nearer to the Left-hand, then I add theſe two Products together for the Anſwer.

The ſecond *Example* is done by multiplying by the *Units* Figure 6, and that Product by 8, becauſe 6 is contain'd in 48 8 times, *&c.*

N. B. This *Variety* may be made more general, thus: Multiply the *Multiplicand* by the *Units* Figure of the *Multiplier*, and divide the remaining Part of the *Multiplier* into Parts, which may be *Multiples*, either of the *Units* Figure, or of one another, and multiply the Product of the *Units* Figure by ſuch *Multiple*, and thoſe Products by their *Multiples*, &c.

Example 1.

Multiply 27624 by 2947.
7
193368
386736
773472
81407928

Example 2.

Multiply 43762 by 3756.
218810
1094050
1531670

164370072

The firſt *Example* is thus performed, *viz. Firſt*, I imagine the *Multiplier* divided into 7, 140, and 2800, which are *Multiples* one of another, and the Sum whereof is equal to the *Multiplier*; ſo I multiply by 7, and that Product by 2 (becauſe 2 times 7 is 14) ſetting the firſt Figure of the Product under the Tens place of the former Product; then I multiply that Product by 2, becauſe 2 times 14 is 28, and ſet the firſt Figure of the Product under the Hundreds place of the firſt Product, the Sum of thoſe three Products is the Anſwer. And thus I not only ſave a Line in the Operation, but have much eaſier Figures to multiply by.

For the ſecond *Example*. I divide the *Multiplier* into 1, 5, 250, and 3500, for their Sum is equal to the *Multiplier*, and they are *Multiples* one of another; then letting the *Multiplicand* ſtand for the 1, I multiply by 5, ſetting the firſt Figure of the Product under the *Units* place of the *Multiplicand*; then I multiply that Product by 5, becauſe 5 times 5 is 25, ſetting the firſt Figure of the Product under the Tens place of the other; alſo I multiply the firſt Product by 7, becauſe 5 times 7 is 35, ſetting the firſt Figure of that Product under the Hundreds place of the firſt; and the Sum of thoſe three Products and the *Multiplicand* is the Anſwer.

Example 3.

Multiply —— 2712 by 3848.

This *Multiplier* I divide into 8,640,3200, whoſe Sum is the *Multiplier*; then I multiply firſt by the 8, and that Product by 8, becauſe 8 times 8 is 64, ſetting the firſt Figure of that Product under the Tens Figure of the firſt Product; this Product I multiply by 5, becauſe 5 times 640 is 3200; and ſet the firſt Figure of that Product under the firſt of the laſt Product, becauſe 5 times 640 is not only 320, omitting the *Units* place, but the whole 3200; and the Sum of theſe three Products is the Product required.

```
   2712
      8
 ------
  21696
 173568
 867840
 --------
 10435776
 --------
```

Here followeth ſome *Examples*, which tho' they do not fall directly under theſe *Varieties*, yet are natural Conſequences of them.

***Example* 1.**

```
  73637
    112
 -------
 8247344
 -------
```

***Example* 2.**

```
  73627
    104
 -------
 7657208
 -------
```

***Example* 3.**

```
   356276
     1216
  -------
  5700416
 4275312
 ---------
 433231616
 ---------
```

***Example* 4.**

```
    76676
    13012
  -------
   920112
 996788
 ---------
 997708112
 ---------
```

MULTIPLICATION
of divers Denominations.

To multiply Numbers of divers Denomination.
This will be a General RULE.

MULTIPLY the Parts of the loweſt Denomination given, by the given *Multiplier*, or ſome of its component Parts; and ſee how many *Units* of the next ſuperior Denomination are contain'd in that Product, which bear in your Mind, and ſet down the Remainder, if there be any; then multiply the ſaid next ſuperior Denomination, and to that Product add thoſe you carry in your Mind: See how many *Units* of the next Denomination are contain'd therein, which bear in your Mind, and ſet down the Remainder, proceeding after this Manner thro' all the Denominations.

EXAMPLE.

If 1 Yard of Cloth coſt 3 s. 5 $\frac{1}{4}$, what will 5 coſt?

Yds. *qrs.*
05

Anſwer —— 17 02 $\frac{1}{4}$

Here I multiply 3 *ſ.* 5 *d.* 1 *q.* by 5; thus, 5 Farthings is 1 Penny Farthing, I ſet down the Farthing, and bear the Penny in Mind; then 5 times 5 is 25, and 1 I had in my Mind is 26 Pence, which is 2 Shillings and 2 Pence, I ſet down the 2 Pence and carry the 2 Shillings; then 5 times 3 is 15, and 2 I carry is 17, which I ſet down, and 'tis done.

EXAMPLE 2.

	l.	*ſ.*	*d.*	*q.*	
If 1 Yard coſt	00	05	07	3,	what will 7 coſt
			7		
	01	19	06	1	

Here I ſay 7 times 3 Farthings is 5 Pence Farthing, ſet down the Farthing and carry 5 Pence; then 7 times 7 Pence is 4 Shillings and 1 Penny, and 5 Pence I carry, makes 6 Pence, which I ſet down, and carry 4; then 7 times 5 is 35 Shillings, and 4 I carried, is 39 Shillings, or 1 Pound 19 Shillings, which I ſet down, and 'tis done.

EXAMPLE 3.

How many Yards are there in 16 Pieces of Cloth, each Piece containing

Yds.	*Q.*	*N.*
26	01	03
		4
105	03	00
		4
423	00	00

Here I multiply by 4, and that Product by 4; becauſe 4 times 4 is 16. Thus 4 times 3 Nails is 12 Nails, or 3 Quarters, ſet down 0 and carry 3; 4 times 1 is 4, and 3 I carry is 7 Quarters, or 1 Yard, and 3 Quarters, ſet down 3 Quarters and carry 1 Yard; 4 times 6 is 24, and 1 is 25, ſet down 5 and carry 2; then 4 times 2 is 8, and 2 is 10, which I ſet down. Do ſo by the other 4, and that Product will be the Anſwer.

EXAMPLE 4.

What is a Ship worth, whoſe 1 18th Part is worth

l.	*s.*	*d.*	*q.*
021	14	03	01
		06	
130	05	07	02
		03	
390	16	10	02

EXAMPLE 5.

If 1 C. *wt.* of Cotton-Wool coſt 4 *l.* 12 *s.* 6 *d.* what will 42 C. 1 *qr.* coſt?

Here I multiply firſt by 6, and that Product by 7; becauſe 6 times 7 is 42; and for 1 *qr.* of a C. *wt.* I take 1 *qr.* Part of the Price of 1 C. *wt.* and add it to the laſt Product.

l.	*s.*	*d.*	*q.*
4	12	6	0
		6	
27	15	0	0
		7	
194	05	0	0
1	03	1	2
195	08	1	2

EXAMPLE 6.

If 1 Pack of Yarn coſt 8 *l.* 12 *s.* 4 *d.* what will 336 Packs coſt.

Here the *Multiplier* is compos'd of three Numbers, *viz.* of 8, 7, and 6; therefore I multiply by thoſe three Numbers one after another.

8 *l.*	12 *s.*	4*d.*
		08
68	18	08
		07
482	10	08
		06
2895	04	00

EXAMPLE 7.

If 1 Piece of Holland Strips coſt 2 *l.* 6 *s.* 5 *d.* what will 426 coſt?

In this *Example* the *Units* Figure, *viz.* 6 is an Aliquot Part of the other Figures, for 42 contains 6 7 times; therefore I multiply by 6, according to the common Method, and that Product by 7, thus; 7 times 6 *d.* is three Shillings and ſix Pence; and 10 times that is 35 Shillings, ſet down 0 in the Pence place, and the 5 in the *Units* place of Shillings, and carry 3; then 7 times 8 is 56, and 3 I carry is 59, which I keep in my Mind; then 7 times 1 is 7, and 59 is 129, the half of which, *viz.* 64 is Pounds, and 1 that remains, ſet in the Tens place of Shillings, and it makes 15 Shillings; alſo I ſet down the 4 in the *Units* place of Pounds, and carry the 6; then 7 times 3 is 21, and 6 is 27, ſet down 7 and carry 2; 7 times 1 is 7, and 2 is 9, which I ſet down; and then, adding theſe two Lines, I have the Anſwer.

l.	*s.*	*d.*
2	6	5
		6
13	18	6
974	15	0
988	13	6

EXAMPLE 8.

At 3 *l.* 2 *s.* 4 *d.* the Piece, what will 2947 coſt?

Firſt, I multiply the Price of 1 Piece by 7, the *Units* Figure, and that Product I multiply by 2, and that laſt Product by 2, according to the Method of the laſt *Example*; the Sum of theſe three Products is the Anſwer to the Queſtion. The reaſon of this Operation is evident from *Example* 1. in *N.B.* of the laſt *Section.*

3 *l.*	2 *s.*	4 *d.*
		07
21	16	04
436	06	08
8726	13	04
9184	16	04

EXAMPLE 9.

At 2 *l.* 5 *s.* 6 *d.* what will 3966 coſt?

I divide 3966 into theſe, *viz.* 6,360,3600; therefore I multiply by 6, and that Product by 6, thus, 6 times 13 Shilling is 78, the half is 39 Pounds, ſet 9 in the units place of Pounds, and carry 3, then 6 times 13 Pounds and 3 I carry is 81, which I ſet down, it makes 819 l. then, becauſe 3600 is 10 times 360, I ſet down the ſame Figures, beginning under the Tens place of Pounds, and the Sum of theſe three Products is the *Anſwer*.

2 *l.*	5 *s.*	6 *d.*
		6
13	13	00
819	00	00
8190	00	00
9022	13	00

I ſhall only mention one *Compendium* more, which I firſt met with in a Treatiſe of *Arithmetick*, written Originally in *French*, by *Sieur Menier* CLAIRECOMBE, which for expedition and univerſal Uſe, is really wonderful; and which I think will be better underſtood by a few good Examples well explained, than by a long and tedious *Rule*.

EXAMPLE I.

	l	*s*	*d*	
What coſt 73 Pieces at	39	9	7	per piece ?
	118	8	9	
	2763	10	10	*Memor.* 7 *s.* 10 *d*
	2881	19	07	

This Example explain'd.

Firſt, I multiply by the 3 in the *Units* place of the *Multiplier*, as in the other *Compendiums*, and the product is 118 *l.* 8 *s.* 9 *d.* then I proceed to multiply by 7, the *Tens* Figure, thus: Firſt I begin by multiplying the 7 *d.* by the 7, ſaying, 7 times 7 is 49 *d.* in 49 *d.* there is 4 *s.* 1 *d.* I ſet down the 1 *d.* in a *Memorandum* at the ſide, and carry 4 *s.*

From thence I go to the ſhillings, ſaying, 7 times 9 is 63, and 4 I carry makes 67 *s.* which is 3 *l.* 7 *s.* I ſet 7 in the ſhillings place in the *Memorandum*, and carry 3 *l.*

Then I go to the Pounds, and ſay, 7 times 9 is 63, and 3 *l.* that I carry makes 66, I ſet down 6 in this ſecond Product, under the place of *Tens* of the firſt Product, leaving the *Units* place of this ſecond product blank, and carry the 6 Tens.

Then I ſay 7 times 3 is 21, and 6 I carry makes 27, which I ſet down before the 6 in the Pounds, and ſo I have finiſhed the Multiplication of this ſecond product. It only remains now that I fill up the Blanks of the *Units* of the Pounds, and of the ſhillings and Pence of this ſecond product; which I do by the following method.

'Tis plain that by multiplying the Pence, Shillings, and Pounds, by 7 of the *Multipliers*, which repreſent 70, or 7 *Tens*, I have *Tens* in the product: So that the Pence and Shillings in the *Memorandum*, are *Tens* of Pence, and Shillings; from that general *Maxim* that multiplying by *Tens* produceth *Tens*, multiplying by *Hundreds* produceth *Hundreds*, &c.

This being granted, 'tis plain that the 7 ſhillings in the *Memorandum* are 70 *s.* equal to 3 *l.* 10 s. I ſet the 3 in the *Units* place of Pounds, and for the 10 *s.* I ſet 1 in the *Tens* place of Shillings, and ſo the place of Pounds is filled up.

And by the ſame Reaſon, the 1 in the Pence place of the *Memorandum* is 1 *Tens* of Pence; and therefore it is that I add a Cypher to the Pence, which in this Example makes 10 *d.* which I ſhould divide by 12, and the *Quotient* ſhould be put in the *Units* place of Shillings, and the *Remainder* in the Pence place; but it being leſs than 12, I put a (0) in the *Units* place of Shillings of the product, and the 10 in the Pence place, and that product is finiſhed; ſo that product is 2763 *l.* 10 *s.* 10 *d.* Then I add theſe two products together, and their Sum is 2881 *l.* 19 *s.* 7 *d.* which is the total product.

N. B. For the eaſier filling up the Blanks in the Pounds, take always half of the Shillings in the *Memorandum*, as here, the half of 7 is 3, which put in the *Units* place, and it fills it up. And for the Pence of the *Memorandum*, always add a (0) to them, and reduce them to Shillings, which ſet in their place, and the remaining Pence in theirs.

This *Rule* is general for all *Multiplications* that hath two Figures in the *Multiplier*.

More Examples *for Learners.*

	l.	s.	d.	
89 Shares at	64	12	4 per Share.	
	581	11	0	*Memorand.*
	5169	06	8	18 *s.* 80 *d.*
Anſwer	5750	17	8	

	l.	s	d.	
93 Tuſſes of Yarn at	55	17	9 *per* Truſs.	
	173	13	3	*Memorand.*
	5209	17	6	19 *s.* 9 *d.*
Anſwer	5383	10	9	

An Example *with* 3 *Figures in the* Multiplier.

	l.	s.	d.		
478 Packs at	46	12	2		
	372	17	4	*Memoran.*	
	3262	11	8	5 s.	10d.
	18643	06	8		
				8	8
Anſw.	22278	15	8	6	8

This Operation explained.

I queſtion not but what was ſaid in the Explanation of the firſt Example, may be ſufficient for underſtanding of the Operation, with the *Tens* and *Units* Figure of the *Multiplier*, both in this and any other Example; I ſhall therefore proceed to explain the method of multiplying by the *Hundreds* Figure of the *Multiplier*, which is this.

Firſt I multiply the 2 in the Pence place by 4 in the *Hundreds* place of the *Multiplier*, ſaying, 4 times 2 is 8 *d.* which I ſet in the Pence place in the *Memorandum*, and carry nothing.

Then I proceed to the Shillings, and ſay 4 times 12 is 48 *s.* which is 2 *l.* 8 *s.* I ſet 8 in the Shillings place in the *Memorandum*, and carry 2 *l.*

Then going to the Pounds, I ſay, 4 times 6 is 24 *l.* and 2 I carry makes 26 *l.* ſo I ſet 6 under the *Hundreds* place of the ſecond product, *viz.* under 2, leaving the *Units* and *Tens* places Blank, and carry 2; then 4 times 4 is 16, and 2 I carry is 18, which I ſet down before the 6, and the *Multiplication* is ended, except the filling up of the Blanks, which is done as followeth.

Take half of the Shillings in the *Memorandum*, which is 4, and place it in the *Tens* place of the Pounds, to fill up that Blank; then I add a (o) to the 8 *d.* in the *Memorandum*, it makes 80 *d.* which is 6 *s.* 8 *d.* this 6 *s.* 8 *d.* I ſet in the *Memorandum*.

Again I take half of the 6 *s.* which is 3, and place it in the *Units* place of the Pounds to fill up that Blank; then I add a (o) to the 8 *d.* in the *Memorandum*, it makes 80 *d.* which is 6 *s.* 8 *d.* this I ſet in the Shillings and pence places in the product, and that product is finiſhed; then I add thoſe 3 products into one Sum, and it makes 22278 *l.* 15 *s.* 8 *d.* for the total Product.

N. B. That to fill up the Blanks of the third Product, you always take the half of the Shillings of the *Memorandum*, and always add a Cypher to the Pence of the *memorandum*; becauſe you conſider the Shillings and Pence of the *memorandum*, as Tens of Shillings, and Pence, tho' produced by *Hundreds*, *Thouſands*, *Tens of Thouſands*, or any other Number; becauſe *Tens* of *Thouſands*, with regard to *Thouſands*, *Thouſands* with regard to *Hundreds*, and *Hundreds* with regard to *Tens*, are all conſidered as *Tens*.

An Example *with* 4 *Figures in the* Multiplier

4567 *Fodders* of *Lead* at 14 *l.* 11 *s.* 9 *d.* per *Fodder*.

	l.	*s.*	*d.*		
	14	11	9	*Memorand:*	
				s.	*d.*
	102	02	3	10	60
	875	05	0	18	90
	7293	15	0	7	60
	58350	00	0	7	00
				10	00
Anſwer	66621	02	3		

Having multiplied by the 567 of the *Multiplier*, as hath been Explained in the preceding Example, I now proceed to explain the method of multiplying by 4 Thouſand, which is thus:

Beginning to multiply at the Pence place, I ſay, 4 times 9 is 36, which is equal to 3 *s.* ſo I put a (0) in the Pence place in the *memorandum*, and carry 3 *s.* then going to the Shillings, I ſay 4 times 11 is 44, and 3 I carry is 47 *s.* which is 2 *l.* 7 *s.* I ſet the 7 in the Shillings place in the *memorandum*, and carry 2 *l.* then proceeding to the Pounds, I ſay, 4 times 4 is 16, and 2 I carry makes 18, I ſet the 8 under the *Thouſands* place of the third Product, and carry 1; then, 4 times 1 is 4, and 1 I carry makes 5, which I ſet down before the 8, and ſo I have done multiplying.

And now for filling up the Blanks in this 4th Product, I proceed in this manner, I take half of the 7 in the Shillings place in the *memorandum* which is 3, and 1 remains, with this 3 I fill up the Hundreds place of this Product, and ſet the 1 that remains under the Shillings place in the *memorandum*, and becauſe there is nothing in the Pence place in the *memorandum*, I place a (0) on the Right Hand of the 1, and it makes 10, the half thereof is 5, this I ſet in the *Tens* place of this Product, and becauſe there is nothing remains in the *memorandum*, I fill the *Units* place of the Pounds, and alſo the Shillings and Pence places with Cyphers, and then add theſe four Products into one Sum, and that will be the Product required.

I ſhould now conclude this wonderfull *Compendium*, (wherein I have been tedious even to a fault already) but that Mr. *Hodgkin* in a late treatiſe of Practice, hath given us another method for filling up the Blanks in any Product whatever, which, whether it be better than this which is already Explained, or no, I ſhall leave to the judgment of the impartial Reader, and ſo proceed to the *Rule* itſelf, which I ſhall illuſtrate with a few *Examples*, and ſo put an end to this *Section*.

RULE.

Place the Quantity of Goods under the Price for a *Multiplier*, then multiply only by the ſignificant Figures, 1, 2, 3, 4, &c. and inſtead of ſetting the odd Farthings, Pence and Shillings in their reſpective places, put them in a place apart, orderly one under another, as *Units* under *Units*, *Tens* under *Tens*, &c. But place the Pounds in their proper places, *i. e.* ſet the firſt Figure of your Pounds in the ſame place from *Unity*, as your *multiplier* is from it.

Then to fill up the vacant places of your Product, put as many Cyphers as belong to your multiplying Figure to the firſt odd money only, whether it be Farthings, Pence, &c. Reduce theſe odd Farthings, Pence, &c. into Pounds, &c. which put into theſe vacant places of your Pounds, Shillings, Pence, and Farthings, and you have done. The ſame is to be done when the Quantity is 100, 200, &c. 1000, 2000, &c. or 10000, &c.

N. B. If there happen to be no odd Shillings, Pence, or Farthings, the vacant places muſt be filled with Cyphers.

EXAMPLE I.

50 Pieces at	3 *l.*	13 *s.*	9 *d.* $\frac{1}{4}$	per *Piece.*
			50	4)10
Anſwer	184	08	6 $\frac{1}{2}$	12)102-$\frac{1}{2}$
				20)88--6
				04---8

This Operation Explained.

Here I multiply by the 5, and beginning with the Farthing, I ſay, 5 times 1 is 5 *qrs.* *or* 1 *d.* 1 *qr.* I ſet the 1 *qr.* in a place apart, and carry 1 *d.* then 5 times 9 *d.* is 45, and 1 I carry makes 46 *d.* or 3 *s.* 10 *d.* I ſet the 10 *d.* in the place apart, under the 1 *qr.* *Units* under *Units*, then I ſay, 5 times 13 is 65 *s.* and 3 I carry is 68 *s.* or 3 *l.* 8 *s.* I ſet 8 in the place apart, and carry 3 *l.* Laſtly, 5 times 3 *l.* is 15 *l.* and 3 I carry makes 18 *l.* which I ſet down, leaving the *Units* place vacant.

And now to fill up the vacancies, I add a Cypher to the 1 *qr.* in the place apart, and divide by 4, the *Quotient* is 2 *d.* and 2 remains, I ſet the 2 *d.* on the Right Hand of the Pence in the place apart, and the 2 that remains in the place of Farthings in the product; then I divide the 102 *d.* in the place apart by 12, and the *Quotient* is 8, which I ſet on the Right Hand of the 8 *s.* and there remains 6 *d.* which I put in the Pence place in the product; then I divide the 88 in the place apart by 20, and the *Quotient* is 4 *l.* 8 *s.* I put the 8 *s.* in the Shillings place, and the 4 *l.* in the *Units* place of Pounds, and the total product is 184 *l.* 8 *s.* 6 *d.* 2 *q.*

What hath been ſaid in the Explanation of this *Example* will (I hope) be abundantly ſufficient for multiplying by any Figure whatever, that ſtands in the *Tens* place of the *Multiplier*; I ſhall therefore give the Operation of two *Examples* without the Explanation.

EXAMPLE 2.

70 *Packs* at 18 *l.* 7 *s.* 3 *d.* 1 *q.* *per Pack.*

	l.	*s.*	*d.*	*q.*	
	18	7	3	1	30
			70		107 $\frac{1}{2}$
Anſw.	1285	8	11	2	108 11
					5 8 1 $\frac{1}{4}$

Example 3.

90 *Hogſheads* at 27 *l.* 17 *s.* 07 *d.* 3 *q.*

	l.	*s.*	*d.*	*q.*	
	27	17	07	3	30
			90		97 $\frac{1}{2}$
Anſwer	2509	08	01	2	18 8 1
					9 8 1 $\frac{1}{4}$

The ſame Explanation alſo holds in whatever place the multiplying Figure ſtands, if according to the *Rule* we place as many Cyphers to the firſt odd money as belong to the multiplying Figure, or as there are places on the Right Hand the ſaid Figure, and alſo place the firſt Figure of Pounds the ſame diſtance from *Unity* as your multiplying Figure ſtands.

Example

EXAMPLE 4.

300 Barrels at 17 *l.* 9 *s.* 9 *d. per* Barrel.

17 *l.* 9 *s.* 9 *d.*	300
300	925
5246 5 0	46 5

EXAMPLE 5.

7000 Tickets at 125 *l.* 11 *s.* 7 *d.* 3 *qrs. per* Ticket.

125 *l.* 11 *s.* 7 *d.* 3 *q.*	4)1000
7000	12)6250
Anſwer 879076 00 10	20)1520 10
	076 0 10

By this *Rule*, and according to theſe *Examples*, it will be eaſie to multiply by any *Multiplier* whatever, carefully obſerving.

1. To have for every ſignificant Figure you multiply by, (*Units* Figure excepted) a diſtinct *Memorandum* or place apart, wherein to put the odd Farthings, Pence, and Shillings.

2. To ſet on the Right Hand of the firſt odd money in each place apart, ſo many Cyphers as there are places on the Right Hand of the multiplying Figure.

3. To place the firſt Figure of Pounds in each product, ſo far diſtant from the place of *Units* as your multiplying Figure is.

4. To fill up the vacancies with the Figures in the place apart proper to each Product rightly reduced by dividing as occaſion requires.

5. *Laſtly*, To add up all the particular products into one total Sum for the *Anſwer*.

Example 6.

3478 Bails at 7 *l.* 7 *s.* 3 *d.* 1 *q. per* Bail.

000
100
908---4

7*l.*	7*s.*	3 *d.*	
		3478	
78	18	2	$\frac{1}{2}$
513	08	11	
2945	08	04	
22090	12	06	
25610	07	11	$\frac{1}{2}$

30
107 2
108 11 1
5 8 11 $\frac{1}{2}$

3000
9750
1812--6
090 12 6

E X A M P L E 7.

777 Tuns at 5 *l.* 11 *s.* 7 *d.* 3 *qrs.* per Tun.

100
625
15,2 1
07 12 1

		777	
39	01	6	1
390	15	2	2
3907	12	1	0
4337	08	9	3

10
62--2
15--2
0 15 2$\frac{1}{2}$

N. B. In ſuch Queſtions as this laſt, where there are two or more Figures alike in the *Multiplier*, the Operation will be very eaſy; for when you have multiplied by the firſt of the ſimilar Figures, there will be no more to do, than to ſet down the ſame Pounds only in their proper places; alſo ſet down the ſame odd Farthings, Pence, &c. as belong to the ſame multiplying Figure in another place, annexing the proper number of Cyphers, and dividing as before.

2. The number of Cyphers annex'd to the firſt odd money, will immediately diſcover to what *Multiplier* each place apart belongs, for if one Cypher be added, the *Multiplier* ſtands in the *Tens* place, if 2 Cyphers be added, the *Multiplier* ſtands in the *Hundreds* place, &c.

Sect. 5. COMPENDIUMS *in* DIVISION.

THIS *Compendium*, ſeems naturally to divide it ſelf into the following VARIETIES.

VARIETY I.

If the *Diviſor* be any of the 9 *Digits*.

RULE.

Draw a ſcore under the *Dividend*, and ask how often your *Diviſor* is contained in your firſt *Dividual*, ſet the *Quotient* Figure under your *Dividual*, thed *Multiply* the *Diviſor* into the *Quotient* Figure, ann ſubtract that Product from the *Dividual* in the mind only, and imagine the next Figure of your *Diviaend* brought to the right hand of the *Remainder* for a new *Dividual*; and ſo proceed with the whole *Dividend*, ſtill ſetting each *Quotient* Figure under its own *Dividual*.

Example 1.	*Example* 2.
4)9376276	5)7198765
2344069	1439753

Example

Example 3:	*Example* 4:
7)13762763	9)71987686
1966109	7998631-7

The firſt Example explained.

Firſt I aſk how often the *Diviſor* 4 in the *Dividual* 9, and the Anſwer is 2 times; this 2 I ſet under the 9, and ſay 2 times 4 is 8, which taken from 9 reſteth 1, to this I imagine the 7 brought, and it makes 13, then how often 4 in 13, the Anſwer is 3 times, and 3 times 4 is 12, which I take from 13 and there reſteth 1; then ſuppoſing the 7 brought to the Right Hand of this 1, it makes 17 for a new *Dividual*; thus I proceed with the whole *Dividend*, ſtill ſetting the *Quotient* Figure under its own *Dividual*.

N. B. That theſe *Multiplications* and *Subtractions* are mentally performed only, as in the *Italian* way of *Diviſion*.

VARIETY 2.

If the *Diviſor* be an Article, *i. e.* any of the nine *Digits* with a Cypher or Cyphers after it.

RULE.

Cut off all the Cyphers in the *Diviſor* with a daſh of the Pen, and as many places from the Right Hand of the *Dividend*, then divide thoſe Figures in the *Dividend*, which are on the left Hand of the cutting off, by the *Digits* Figure of the *Diviſor*, as in the laſt caſe, and to the *Remainder* bring theſe that are cut off, as was directed in *Diviſion*.

Example 1.

6,00)71687,62

11947- $\frac{562}{600}$

Example 2.

9,0000)96876,8762

10764- $\frac{8762}{90000}$

Theſe are too eaſy to need any Explanation.

VARIETY 3.

If the *Diviſor* be ſome *Compoſite* Number.

RULE.

See what two Numbers your *Diviſor* is compoſed of, and divide the given *Dividend* by one of thoſe *Component* parts, as in the firſt Caſe, and then divide that *Quotient* by the other part, and that *Quotient* will be the *Quotient* required.

But here it muſt be obſerved, that ſince there are two *Diviſions*, there may be and generally is two *Remainders*, in each *Diviſion* one, but neither of theſe are the true *Remainder*, but it muſt be found by this *Rule*.

Multiply the firſt *Diviſor* into the laſt *Remainder*, to that Product add the firſt *Remainder*, and that Sum will be the true *Remainder*.

Example 1.

4)769497 by 16

4)192374--1

48093--2

$\frac{9}{16}$

Example 2.

6)6376479 by 36

6)1062746 3

177124-2

$\frac{15}{36}$

In the 1ſt *Example* I divide by 4, and that *Quotient* again by 4, becauſe 4 times 4 is 16; it had been the ſame thing if I had Divided by 2 and 8, becauſe 2 times 8 is alſo 16. And then for the *Remainder*, I multiply the firſt *Diviſor* 4, into the laſt *Remainder* 2, the Product is 8; to that I add the firſt *Remainder* 1, and the true *Remainder* is 9, *i. e.* $\frac{9}{16}$ parts of an *Unit*.

Example 3.	*Example* 4.
8)97130767 by 48	7)810937169 by 63
12141345-7	115848167-0
2023557-3 $\frac{31}{48}$	12872018-5 $\frac{35}{63}$

DIVISION *of divers Denominations.*

RULE.

DIVIDE the parts of the higheſt *Denomination* by your given *Diviſor*, ſetting down the *Quotient* under the ſaid *Denomination*, and if any thing remain, reduce it to the next inferiour *Denomination*, and to it add the given parts of that *Denomination* if there is any, and divide thoſe after the ſame manner, and ſo proceed through all the *Denominations*.

EXAMPLE 1.

If 8 Pieces of Holland coſt 10 *l.* 19 *s.* 2 *d.* what will 1 coſt?

8)10 l. 19 s. 2 d. 0 q.

Anſwer 1 07 4 3

This Operation explain'd.

Firſt I ask how often 8 in 10, 1 time, which is 1 l. and there reſts 2 l. or 40 ſhillings and 19 ſhillings is 59, then 8 in 59 is 7 times, which is 7 s. and there reſteth 3 s. or 36 Pence, and 2 makes 38; then 8 in 38 is 4 times, which is 4 Pence, and there reſts 6 Pence, or 24 Farthings; 8 in 24 is three times, *i. e.* 3 qrs. and there reſteth nothing, and 'tis done.

E X A M P L E 2.

Bought 9 Hogſheads of Wine for 110 l. 19 s. 3 d. what does 1 coſt?

l. s. d.
9)110---19---3

Anſwer 12---06---7

E X A M P L E 3.

If 18 Pieces coſt 763 l. 11 s. 6d. what will 1 coſt?

l. *s.* *d.*
3)763---11---6

6)254---10---6

Anſwer 42---08---5

EXAMPLE 4.

If 48 C. wt. coſt 51 l. 5. 9. what will 1 Coſt?

		l.	*s.*	*d.*	
	6)	51	5	9	
	8)	8	10	11	$\frac{1}{2}$
Anſwer		1	01	04	$\frac{1}{4}$ —— $\frac{6}{8}$

Example 5.

Suppoſe 6 Merchants bought 3693 Yards of *Pluſh*, to have equal Shares, what is each Man's Share?

		Yds.	*Q.*	*N*
	6)	3693	0	0
Anſwer		615	2	0

Example 6.

Suppoſe 21 Grocers bought 38 *C.* 1 *qr.* 8 *lb.* of Sugar, to have equal Shares; what is each Man's Share?

		C.	*q.*	*lb.*	*oz.*	*dr.*		
	3)	38	1	8	0	0		
	7)	12	3	2	10	10	2	*Dr.*
Anſw.		1	3	8	6	1	3	$\frac{11}{21}$

VARIETY 2.

To divide divers Denominations by an Incompoſite Number, i. e. *a Number which can be meaſured only by an* Unit.

An Example *or two will ſerve for this as well as a* Rule.

EXAMPLE 1.

Suppoſe 427 *l.* 13 *s.* 2 *d.* 2 *q.* were to be equally divided amongſt 87 men, what is each man's ſhare?

```
       l     s.   d.   q.
87)427      13    2    1   (4 l. 18 s. 3 d. 3 q.
   ---                      ---------------------
    79
     20
   -----
87)1593(18 s.               Anſw. 4 l. 18 s. 3 d. 3 q.
   -----
    723
   -----
     27
     12
   -----
87)326(3 d.
    65
     4
87)261(3 q.
   -----
     0
```

EXAMPLE 2.

Suppoſe 29 Packs coſt 727 *l.* 12 *s.* 8 *d.* what does 1 Pack coſt at that rate?

l. *s.* *d.* *l.* *s.* *d.* *q.*
29)727 12 8 (25 1 9 2
147
2
20
29)52(1 *s.*
23
12
29)284(9 *d.*
23
4
29)92(3 *q*
5

This is performed in all reſpects as the laſt was, and therefore needs no Explanation.

Anſwer 25 *l.* 1 *s.* 9 *d.* 3 *q.*

EXAMPLE 3.

If 4598 Laſts coſt 353720 *l.* 6 *s.* 2 *d.* what will 1 coſt?

4598)353720 *l.* 6 *s.* 2 *d.* (76 *l.* 18 *s.* 7 *d.*
31860
4272
20
85446 (18 *s.*
39466
2682
12
32186 (7 *d.*
(0)

Anſw. 76 *l.* 18 *s.* 7 *d.*

EXAMPLE 4.

Suppoſe 724 Pieces of Cloth contain 27738 Yards, 1 Quarter, what does 1 Piece contain, they being of equal length?

Yds. *Qrs.* *Yds.* *Qrs.* *N.*
724)27738 1 (38 1 1
6018
226
4
724)905(1
181
4
724(1
0 *Anſw.* 38 *Yds.* 1 *Qr.* 1 *N.*

Here I Divide the Yards by the *Diviſor*, according to common *Diviſion*, and the *Quotient* is 38 Yards, and there remains 226, which, becauſe they are parts of a Yard, I multiply by 4, becauſe 4 Quarters is one Yard, and take in 1 *Qr.* and divide that Product by my *Diviſor* 724, and the *Quotient* is 1 *Qr.* and there reſteth 181, which becauſe it is part of a Quarter, I multiply it by 4, and divide by my *Diviſor*, and the *Quotient* is 1 *Nail*, and nothing remains. So that each Piece contains 38 *Yds.* 1 *Q.* 1 *N.*

VARIETY 3.

To Divide Pounds, Shillings, and Pence, by Pounds, Shillings, and Pence.

'It would be very tedious to give ſuch a general *Rule* for this *Variety*, as would take in all the ſeveral Circumſtances of it, I ſhall therefore inſtead of that, give you three Examples with their Operations, and a full explanation of two of them.

EXAMPLE 1.

How many Pieces of Gold, each valued at 2 *l.* 3 *s.* 9 *d.* are contain'd in 538 *l.* 2 *s.* 6 *d.*

See the Operation.

l.	*s.*	*d.*		*l.*	*s.*	*d*	
2	3	9	)	538	2	6(	246 Pieces.
				4	7	6	
				0	12	6	
						10	
				9	5	0	
				8	15	0	
					10	0	
						10	
				5	0	0	
				8	2	6	
				13	2	6	
				13	2	6	
				00	0	0	

This Operation explained.

Firſt, I aſk how often 2 *l.* is contain'd in 5 *l.* the Anſwer is 2, ſo I put 2 in the *Quotient*, and multiply the *Diviſor* by it, and the Product is 4 *l.* 7 *s.* 6 *d.* which I place under the *Dividend*, ſo as that 4 *l.* may ſtand under 5 *l.* and ſubtract the whole Product from 5 *l.* only, and there remains 12 *s.* 6 *d.* this I multiply by 10 and add the 3 in the *Tens* place of Pounds into the Product, and it makes 9 *l.* 5 *s.* then, I aſk how often 2 *l.* in 9 *l.* the Anſwer is 4, which I ſet in the *Quotient*, and multiply the *Diviſor* by it, and the

Product is 8 *l.* 15 *s.* which I ſubtract from 9 *l.* 5 *s.* and the remainder is 10 *s.* this I multiply by 10, and add the 8 *l.* 2 *s.* 6 *d.* into the Product, and the Sum is 13 *l.* 2 *s.* 6 *d.* then I ask how oft 2 in 13 *l.* the Anſwer is 6, by which I multiply my *Diviſor*, and the Product is 13 *l.* 12 *s.* 6 *d.* this I ſubtract from the *Dividual*, there remains nothing. And the Anſwer is 246 Pieces.

EXAMPLE 2.

How many *Portugal* Pieces each 1 *l.* 7 *s.* 6 *d.* will make 321 *l.* 15 *s.*

See the Operation.

1 l. 7 s. 6 d.)	321 l.	15 s.	0 d.	(234 Pieces.
	2	15	0	
		05	0	
			10	
	4	10	0	
	4	02	6	
	0	07	6	
			10	
	3	15	0	
	1	15	0	
	5	10	0	
	5	10	0	
	0	00	0	

EXAMPLE. 3

Divide 31 l. 17 s. 6 d. by 12 l. 12 s. 6 d. 3 q.

l.	*s.*	*d.*		*l.*	*s.*	*d.*	*q.*	
12	12	6	)	31	17	6	3	(2 *l.* 10 *s.* 6 *d.*
				25	05	0	0	
				06	12	6	3	
				06	06	3	0	
					06	3	3	
					06	3	3	
					(0)			

This Operation explained.

Firſt, I aſk how often 12 l. is in 31 l. Anſwer 2 l. then I multiply the *Diviſor* by 2, the Product is 25 l. 5 s. which I take from 31 l. 17 s. 6 d. 3 qrs. there reſts 6 l. 12 s. 6 d. 3 qrs. for a new *Dividual*; then, I ſay, how often 12 l. in 6 l. 12 s. or 132 Shillings, the Anſwer is 10 times, which I ſet in the place of Shillings in the *Quotient*, and becauſe 10 s. is one half of a Pound, I multiply the *Diviſor* by half, or which is the ſame thing, I divide by 2, and the *Quotient* is 6 l. 6 s. 3 d. which I ſet under the *Dividual* and ſubtract, there reſteth 6 s. 3 d. 3 q. for a new *Dividual*; then, how often 12 l. 12 s. 6 d. in 6 s. 3 d. 3 q. or, 12 in 75 d. which is 6 d. this I ſet in the Pence place in the *Quotient*, and becauſe 6 d. is 1 40th part of a Pound, I multiply the *Diviſor* by 1 40th, or divide it by 40, the *Quotient* is 6 s. 3 d. 3 q. which I ſet down and ſubtract, there remains nothing, and 'tis done.

SECTION 7.

MULTIPLICATION *and* DIVISION *of divers Denomination.*

SUPPOSE I were to take any Fractional part of a Number, conſiſting of one *Denomination*, or of many, and the *Numerator* of the *Fraction* more than an *Unit*.

RULE.

Multiply the given *Number* by the *Numerator* of the *Fraction*, as in Multiplication of whole Numbers, if the given *Number* be a whole *Number*, or of one *Denomination*, or by *Multiplication* of divers *Denominations*, if it is of many; and divide that Product by the *Denominator*, and that *Quotient* will be the *Anſwer*.

EXAMPLE 1.

What are the $\frac{4}{5}$ parts of a Ship's Cargo worth, the whole being valued at 2713 l. 12 s. 8 d.

```
                 4
        ------------------
        5)10854  10   8
        ------------------
Anſwer    2170   18   1 1/2 —— 2/5
```

EXAMPLE 2.

Suppoſe *A* and *B* buy a parcel of Yarn, which coſt 486 l. 16 s. 4 d. *A* to pay 5 8ths of the Price, and *B* 3 8ths of the Price, how much muſt each pay?

	l.	*s.*	*d.*	*q.*		*l.*	*s.*	*d.*	*q.*
8)	486	16	4	0		60	17	0	2
	60	17	0	2				3	
			5						
A	304	5	2	2	*B*	182	11	1	2

EXAMPLE 3.

A and *B* bought 74 C. weight, 1 Qr. 15 lb. of Cotton Wool, which coſt 376 l. 4 s. 9 d. *A* to have 7 12ths, and *B* 5 12ths, how much Wooll muſt each have, and what muſt each pay?

	C.	Q.	lb.	
12)	74	1	15	
	6	0	22	4
				7
A's part of the Wooll	43	1	15	12
	6	0	22	4
				5
B's part of the Wooll	30	3	27	4

12)	376 *l.*	4 *s.*	9 *d.*	0 *q.*
	31	7	0	3
			7	
A's part of the Price	219	9	5	1

	l.	s.	d.	q.
	31	7	0	3
B's part of the Price,	156	15	5 3	3

EXAMPLE 4.

Three *Merchants*, viz. *A B* and *C*, purchaſe a Ship and Cargo, which coſt 586 l. 12 s. 8 d. *A* was to pay 2 5th, *B* to pay 3 8ths, and *C* the reſt; what muſt each pay?

	586 *l.*	12 *s.*	8 *d.*		
			2		
	5)1173	5	4		
A's part	234	13	0	$\frac{3}{4}$	$\frac{1}{5}$

	586 *l.*	12 *s.*	8 *d.*
			8
	8)1759	18	0
B's part	219	19	9

	586 l.	12 s.	8 d.		
A's part,	234	13	0	$\frac{3}{4}$	$\frac{1}{5}$
B's part,	219	13	9		
Sum	455	12	9$\frac{3}{4}$	$\frac{1}{5}$	Subtract
C's part	130	19	10	$\frac{4}{5}$	

N. B. It will be very convenient in all the following *Rules* to know,

1. That if the difference between the *Numerator* and *Denominator* be an *Unit*, and the *Fraction* be either proper or improper, *i. e.* the *Denominator* bigger or leſſer than the *Numerator*, you need not to multiply by the *Numerator* at all, but only to divide by the *Denominator*; and if the *Denominator* be leſs than the *Numerator*, add, otherwiſe ſubtract that *Quotient* to or from the given Number, and the Sum or difference will be the Anſwer.

2. Or if the difference between the *Numerator* and *Denominator* be more than an *Unit*, multiply the given number by the ſaid difference, and divide that Product by the *Denominator*, and add, or ſubtract that *Quotient* to, or from the given Number, according as the *Denominator* is bigger, or leſſer than the *Numerator*, and the Sum, or difference is the *Anſwer*.

3. From theſe two Obſervations it is very evident, that if the *Diviſor*, *i. e.* the *Denominator* be broken into two parts, as directed in *Compendiums*, and the aforeſaid difference be either an *Unit* bigger, or leſſer than one of thoſe parts, you need not to multiply at all by the ſaid difference, but only divide firſt by that part which differeth from the ſaid difference by an *Unit*, and according as the ſaid difference is an *Unit* more, or leſs than the part you muſt add or ſubtract, that *Quotient* to or from the given Number; then, you muſt divide that Sum or Remainder by the other part of the *Denominator*, and if the *Denominator* be bigger than the *Numerator*, add, or otherwiſe ſubtract that laſt *Quotient* to, or from the given Number, and the Sum, or Remainder will be the *Anſwer*.

4. Or if the difference of the *Numerator* and *Denominator* be an Aliquot part of the *Denominator*, there will be no occaſion either to multiply by the

ſaid difference, or divide by ſuch Aliquot part, but only divide the given number by the Denominator of ſuch Aliquot part, and ſo add, or ſubtract that *Quotient* to, or from the given Number, and the Sum, or Remainder is the *Anſwer*.

Example 5.

What is the value of $\frac{27}{32}$ parts of an Eſtate, whoſe value is 364 *l*. 16 *s*. 8 *d*.

	364 *l*	16 *s*.	8 *d*.
			5
	4)1824	3	4
	8) 456	0	10
Subtract	57	0	1 $\frac{1}{4}$
Anſwer——	307	16	6 $\frac{3}{4}$

Here the Difference between the Numerator and Denominator is 5, therefore I multiply by 5, and divide the Product by the Denominator 32, and becauſe the Numerator is leſs than the Denominator, I ſubtract the Quotient from the Multiplicand, and the Remainder is the Anſwer.

Or without Multiplication by the 3*d Obſervation, thus:*

	4)364 *l*.	16 *s*.	8 *d*.	*q*
Add	91	04	2	0
	8)456	00	10	0
Subtract	57	00	01	1
Anſw.	307	16	06	3

Here becauſe 5, which I ſhou'd multiply by, is 1 *Unit* more than 4, one of the Aliquot Parts of 32, I Divide by 4, and add, then I multiply the Sum by 8, and Subtract.

EXAMPLE 6.

What is the $\frac{105}{112}$ part of 51 l. 12 s. 8 d.

	4)51 l.	12 s.	8 d.	q.
	4)12	18	2	0
Subtract	3	4	6	2
Anſwer	48	8	1	2

In this Example the difference between the Numerator and Denominator is 7, which is an Aliquot part of the Denominator, *viz.* 1 6th, thereſore, I divide by 16, and ſubtract the *Quotient* from the given Number, becauſe the *Denominator* is bigger than the *Numerator*, and the *Remainder* is the *Anſwer.*

SECTION 8.

REDUCTION.

REDUCTION teacheth to reduce *Numbers*, whether they be *Money*, *Weight*, *Time*, *Motion*, &c. from one Denomination to another, diſcovering the ſame value, but in different terms.

All *Reduction* is performed either by *Multiplication* or *Diviſion*; or by *Multiplication* and *Diviſion*; and this admits of three *Caſes*.

CASE 1.

When greater Denominations *are to be Reduced into leſſer.*

RULE.

Multiply the greater Denomination by ſo many of the next leſſer, as are equal to one of the greater, and that Product will be in that next leſſer Denomination; and this is called *Reduction deſcending.*

Example 1.

In 376 *l.* how many *Farthings?*

20	Or thus,
7520 Shillings	376
12	8
90240 Pence	3008
4	120
360960 Farthings	360960 Farthings.

The reaſon of the firſt way is evident from the *Rule* above, and the reaſon of the other is becauſe 960 Farthings is 1 Pound, and 8 times 120 is 960, therefore, *&c.*

Example 2.

In 489 l. 16 s. 9 d. 1 q. how many Farthings?

489 l. 16 s. 9 d. 1 q.
20
9796
12
117561
4
470245

Here, when I multiply by 20, I take 16 s. into the Product, when I multiply by 12, I take 9 d. in, and when by 4, I take in 1 q.

E X A M P L E 3.

In 769 Yards how many Nails?

4

3076 Q.

4

12304 N.

Or thus,

769

16

12304 N.

Here I multiply by 16, becauſe 16 Nails is one Yard.

Example 4.

In 687 Ells Engliſh, how many Nails?

5

3435 Q.

4

13740 N.

Or thus,

687

20

13740 N

Here I multiply by 20, becauſe 20 Nails is 1 Ell Engliſh.

Example 5.

In 567 Ells Engliſh, 3 Q. 2 N. how many *Nails*?

5

3838

4

15354

Or thus,

767

20

15354

I add in 14 Nails, as I multiply by 20.

Example 6.

In 647 *lb.* Troy, how many *Grains* ?

12

7764 *Oz.*

20

155280 *P. wts.*

24

3726720 *Gr.*

Here I multiply the *lbs.* by 12, becauſe 12 *oz* are 1 *lb.* and that Product is Ounces ; and ſo for the reſt, according to the preceding *Rule*, and the Table for *Troy* weight.

EXAMPLE 7.

In 468 *lb.* *Avoirdupois*, how many *drs.* ?

16

7488

16

119808 *Dr.*

Or thus,

468

2340

11700

119808

In this I conſider that 256 *drs.* is 1 *lb.* then I divide 256 into 1, 5, and 250. So I multiply by 5, and that Product by 50, according to Variety, adding thoſe two Products and the top line together for the Anſwer.

EXAMPLE 8.

In 725 *lb.* 11 *oz.* 14 *drs.* how many *Drams* ?

16

11611

16

185790

Here I take 11 *oz.* into the Product, when I multiply by the firſt 16, and the 14 *drs.* when I multiply by the latter 16.

EXAMPLE 9.

In 87 *C. wt.* how many *lb.*?

4	Or thus, 87
	87
348 *Q.*	87
28	87
9744 *lb.*	9744

I have ſet down the *C. wt.* 4 times, twice *Units* under *Units*, and *Tens* under *Tens*, and twice more, each time one place towards the left; then I add up thoſe 4 lines for the Anſwer.

The laſt Queſtion another way.

87
112
9744 *lb.*

Here I multiply the *C. wts.* by 112, the Pounds in one *C. wt.* and that Product is Pounds.

EXAMPLE 10.

In 62 *C.* 2 *Q.* 18 *lb.* how many *lb.*?

4	Or thus,	Or thus,
250	62	62
28	62	112
	62	7018
	6274 add	
7018	7018	

Example 11.

In 78 *C.* 1 *qr.* 12 *lb.* 12 *oz.* 8 *dr.* how many *dr.*

4

313 *Q*

2

8776 *lb.*

16

140428 *oz*

16

2246856 *dr.*

Example 12.

In 27 Tuns of Wine, how many Pints?

127

4

508 *Hogſheads*

7

3556

9

32004 *Gal.*

8

256032 *Pints.*

The laſt thus.

127

2016

2032

254

256032 *Pints.*

Here I multiply by 2016, the Pints in 1 Tun.

CASE 2.

When leſſer Denominations *are to be Reduced into greater.*

RULE.

Divide the leſſer Denomination by ſo many of thoſe leſſer, as are equal to an *Unit* of the next greater, and that *Quotient* will be the next greater Denomination; and this is called *Reduction* Aſcending.

N. B. In

N. B. In this Caſe we will take the ſame Examples that we had in the laſt Caſe inverted, which will be a Proof of the work in both Caſes.

EXAMPLE 1.

In 360960 Farthings, how many Pounds ?

4)360960

12)90240

20)7520

Anſw. 376 *l.*

Here I Divide Farthings by 4 for Pence, Pence by 12 for Shillings, and Shillings by 20 for Pounds.

EXAMPLE 2.

In 470245 Farthings how many Pounds ?

4)470245

12)117561 $\frac{1}{4}$

20) 979,6 9

Anſ. l. 489--16--9--1

EXAMPLE 3:

In 12304 Nails, how many Yards ?

4)12304

4) 3076

Anſwer 769 *Yds.*

Example 4.

In 15354 Nails how many Ells Engliſh ?

4)15354

5)3838-2

Anſwer 767 Ells, 3 Q. 2 N.

EXAMPLE 5.

In 3726720 Grains, how many *lb.*

4)3726720

6) 931680

20) 155280 *p. wt*

12) 7764 *oz.*

Anſwer 647 *lb.*

Here I divide by 4, and 6, *i. e.* 24 to bring *grs.* into *p. wts.* thoſe I divide by 20; to bring *p. wts.* into *oz.* and thoſe by 12 to bring *oz.* into *lbs.* The reaſon of this *Operation* is evident from the laſt *Rule*, and the Table of *Troy weight*.

EXAMPLE 6.

In 119808 *Dr.* how many *lb. Avoirdupois* ?

4)119808

4) 29952

4) 7488 *oz*

4) 1872

468 *lb.*

Here I divide by 4, and 4, *i. e.* by 16 to bring *drs.* into *oz.* thoſe by 4 and 4, *i. e.* 16, to bring *oz.* into Pounds.

Example 7.

In 185790 *dr.* how many *lb.*

$$\begin{array}{l}
4)185790\\ \hline
\left.\begin{array}{r}4)46447\text{-}2\\ \hline 4)11611\text{-}3\end{array}\right\}14\ dr.\\ \hline
\left.\begin{array}{r}4)2902\text{-}3\\ \hline 725\text{-}2\end{array}\right\}11\ oz.
\end{array}$$

Answer 725 *lb.* 11 *oz.* 14 *dr.*

Example 8

In 7018 lb. how many C. weight?

$$\begin{array}{l}
4)7018\\ \hline
\left.\begin{array}{r}7)1754\text{-}2\\ \hline 4)\ 250\text{-}4\end{array}\right\}18\ lb.\\ \hline
\quad 62\text{-}2\\ \hline
\end{array}$$

Answer 62 *C.* 2 *q.* 18 *lb.*

In 2246856 *dr.* how many *C.* weight?

4)2246856

4)561714-0 } *dr.*

4)140428-2 } 8

4)35107-0 } *oz.*

4)8776-3 } 12

7)2194-0 } *lb.*

4)313-3 } 12

78-1

Anſwer 78 *C.* 1 *qr.* 12 *lb.* 12 *oz.* 8 *dr.*

Example 10.

In 256032 Pints how many Tuns?

8)256032

7)32004

9)4572

4)508

Anſwer 127 *Tuns*

Example

CASE 3.

Caſe 3. When a Number is to be Reduced from one Denomination to another, and an Unit of one Denomination is not an Aliquot part of an Unit of the other Denomination.

RULE.

Reduce the given Number into ſome Denomination, which is an Aliquot Part of an Unit of that Denomination it is to be Reduced into; then, Reduce it out of that Denomination into the Denomination required.

N. B. All Queſtions in this Caſe require both *Multiplication* and *Diviſion* for their ſolution: a great deal of labour may therefore be ſaved many times, (not only in this Caſe, but in many other inſtances) by obſerving, that if the Number you are to Divide by, be juſt an Unit leſs than that you are to Multiply by, you need only to Divide, and add the Quotient to the *Dividend*, for the Anſwer. But if the *Diviſor* be juſt an Unit more than the Number you are to multiply by, divide by your *Diviſor* and ſubtract the *Quotient* from the *Dividend* for the Anſwer.

EXAMPLE 1.

In 673 Guineas, each 21 s. how many Pounds?

```
   673
    21
 ------
20)14133
 ------
l. 706-13
```

Firſt, I multiply the Guineas by 21, to bring them into Shillings, then I Divide thoſe Shillings by 20 to bring them into Pounds.

Example

The ſame another way.

2,0)67,3

33--13 Add.

l. 706--13

EXAMPLE. 2.

In 879 l. how many Guineas each 21 s.?

20

7)17580

3)2511-3

l. 837-3

Or thus, 7)879

3)125--4 } 18 s
Subtract 41--2

Anſwer. l. 837--3

EXAMPLE 3.

In 1247 Marks, how many Pounds?

2

3)2494 Nobles.

l. 831--6--8

Or thus,
3)1247

Subtract 415--13--4

l. 831--6--8

Example 4.

In 637 Piſtoles, each 16 s. 6 d. how many Pounds?

11

7007

3

40)21021

l. 525--10--6

Firſt, I multiply the Piſtoles by 33, the Sixpences in 1 Piſtole, the Product is Sixpences, which I Divide by 40, the Sixpences in 1 l. the Quotient is 525 l. and there remains 21 Sixpences, *i. e.* 10 s. 6 d. the Anſwer is 525 l. 10 s. 6 d.

Example

Example 5.

In 486 Moidores, each 1 *l.* 7 *s.* how many Jacobus's, each 1 *l.* 3 *s.*?

6
8---2
648
1 *l.* 3 *s.*)656--2(56
5----15 10
0---- 5(570
10
7 10
6 18
0 12
10
12 0
11 10
0 12
23

Or thus, 656-2
20
23)13122(570
162
0012
23
Anſ. $570\frac{12}{23}$ *Jacob.*

This Operation is according to compendiums in *Diviſion* which was done only for Variety, ſor the other way is better.

EXAMPLE 6.

In 967 Yards, how many Ells Engliſh?

4 *Or thus,*

5)3868 5)967

193-2 *Subtract*

Ells 773-3 763-3

Example 7.

In 769 Ells Engliſh, how many Ells Flemiſh?

5 *Or thus,*

3)3845 3)769

256-1

Ells Fle. 1281-2 1281-2 *Ells Flemiſh.*

Here I Divide by 3, and becauſe I ſhould have Multiplied by 2 the difference between the *Multiplier* and the *Diviſor*, I add the *Quotient* double to the Ells *Engliſh*.

SECTION 9.

The Golden RULE.

THIS *Rule* hath three Appellations, for ſometimes it is called the *Golden Rule*, by way of eminence, it being of ſuch wonderful uſe in all practical parts of the MATHEMATICKS. Sometimes it is called the *Rule of Three*, becauſe there are always Three Numbers given to find a Fourth. And at other times it is called the *Rule of Proportion*, becauſe by it we find a Fourth Proportion to the Three given Numbers.

This *Rule* is alſo Divided into the *Single* and *Double Rule*, and theſe again are Subdivided into *Direct* and *Inverſe*. We ſhall firſt treat of the *Single Rule*, but without any diſtinction of *Direct* and *Inverſe*, any further than only to acquaint the Reader when a Queſtion is *Direct*, and when it is *Inverſe*, and alſo how to work the one and the other. We ſhall therefore proceed to the

GOLDEN RULE *Single*.

IN this Rule there always three Numbers given to find a Fourth, and from hence (as was obſerv'd above) it is called the *Rule of Three*. Of theſe three given Numbers, two always imply a *Suppoſition*, and have commonly *if*, or *Suppoſe*, going before them; and the other is called a *Demand*, becauſe ſome Words implying a *Demand*, as *what will*, *how much*, *how long*, &c. always goes before it. One of the *Suppoſitions* is of the ſame kind with the *Demand*, and the other is of the ſame kind with the thing ſought. When you have found out the *Demand*, place it in the third Place or Place next the Right Hand; then ſee whether of the two *Suppoſitions* is of the ſame kind with the *Demand*, and place it in the firſt Place. or Place next to the Left Hand, and the other *Suppoſition* muſt ſtand in the Middle.

If the Firſt and Third Numbers be not both of one Denomination, they muſt both be reduced into the loweſt Denomination that is given in either of them; and if the ſecond be of many Denominations, reduce it to the loweſt Denomination given; and the Anſwer will be in the ſame Denomination that you reduce the ſecond into.

If (according to the nature of the Queſtion) the fourth Number ought to be greater than the ſecond, you muſt Multiply the ſecond Number by the greater Extream, and Divide the Product by the leſſer Extream, and the *Quotient* will be the Anſwer to the Queſtion.

But if the fourth Number ought to be leſſer than the ſecond, Multiply the ſecond by the leſſer Extream, and Divide the Product by the greater Extream, and the *Quotient* will be the Anſwer to the Queſtion, if there be no Remainder.

But if there be a Remainder, Reduce it to the Denominator next below that your ſecond number is of, and divide by your former *Diviſor*; the *Quotient* is another part of the Anſwer in this next lower Denomination. And if there be a Remainder ſtill, reduce it to the next lower Denomination, and Divide by the ſame *Diviſor*, and ſo proceed to the loweſt Denomination, and if there be a Remainder then alſo, it muſt be made the Numerator of a *Vulgar Fraction*, whoſe Denominator muſt be your *Diviſor*, and ſo you will have the Anſwer compleat. And,

Obſerve, That if any of the *Dividends* be leſſer than the *Diviſor*, reduce it to the next *Denomination*, and to the next again, and ſo on, till you have a *Dividend* as big as the *Diviſor*.

N. B. The

N. B. The firſt and third Numbers are called Extreams, the greater whereof is called the greater Extream, and the leſſer is called the leſſer Extream.

Now although we think the Diſtinction of *Direct* and *Inverſe* to be prejudicial to a Learner (for a reaſon given elſewhere) yet, becauſe we would not omit any thing that may be of uſe to him, when he ſhall meet with ſuch a diſtinction, we will lay down the *Rules* uſually given by Authors for that purpoſe.

RULE 1.

If more require more, or leſs require leſs, *i. e.* if the 3d Number be greater or leſs than the firſt, and the 4th ought to be accordingly greater, or leſs than the 2d, the Queſtion is *Direct:* And then you Multiply the 2d and 3d Numbers together, and Divide the Product by the firſt, and the *Quotient* is the Anſwer to the Queſtion.

RULE 2.

If more require leſs, or leſs requires more, *i. e.* If the third Number being greater, or leſs than the firſt, the 4th on the contrary ought to be leſs, or greater than the 2d, that Queſtion is *Indirect*, or *Inverſe*; and in that Caſe you Multiply the firſt and ſecond Numbers together, and Divide that Product by the third, and the *Quotient* will be the Anſwer to the Queſtion.

Example 1.

If 12 Yards of Cloth coſt 16 Shillings, what will 72 Yards coſt at that rate?

In this Queſtion 12 Yards, and 16 s. are the two Suppoſitions, known to be ſo by the Word *If*, being placed immediately before them, and 72 Yards is the Demand, or Number about which the Queſtion is asked, known by the Words, *What will*, going immediately before it; therefore I place 72 in the place next to the Right Hand; and becauſe 12 is of the ſame kind with the Demand, (they both being Cloth, I place it in the place next to the left Hand, and 16 s. in the middle, and then the Numbers will ſtand thus.

Yards.	*s.*	*Yards.*
12	16	72

Now, becauſe the firſt and third Numbers are both of one Denomination, *i. e.* both Yards, and alſo the 2d only of one Denomination, *i. e.* ſhillings, they none of them need to be Reduced. Next, I conſider, that 72 Yards will coſt more than 12 Yards, but the 2d Number is the Price of 12 Yards, and the 4th Number is the Price of 72 Yards, and therefore, the 4th Number, which is the Price of 72, muſt be greater than the 2d, which is the price of 12 Yards, ſo I multiply the 2d Number into the greater Extream, and Divide that Product by the leſſer Extream, and the *Quotient* is the Anſwer in Shillings, becauſe the 2d Number is Shillings.

See the Operation.

12 16 72
16

12)1152

2,0)9,6

Anſwer 4 *l.* 16 *s*

N. B. Now ſince more Cloth will coſt more Money, the Queſtion belongs to the *Rule of Three Direct.*

EXAMPLE 2.

If 16 Cotton Ends coſt 18 *l.* 16 *s.* 2 *d.* what will 96 coſt at that rate.

```
Ends       l  s d.      Ends.
  16      18  6 2         96
             20
          -------
            376
             12
          -------
           4514
              6
        ---------
          27084
             16
      -----------
      4)433344
      -----------
      4)108336
      -----------
      12)27084
      -----------
       2,0)225,7
      -------------
      l. 112 17 0
```

In this Queſtion the Demand lieth upon 96 Ends, known by the Words *what will*, going before; and 16 is of the ſame kind with 96, therefore I place 96 next to the Right Hand, and 16 next the Left, and 18 *l.* 16 *s.* 2 *d.* in the middle; and becauſe the ſecond Number is of many Denominations, I Reduce it to the loweſt, *i. e.* Pence; and becauſe 96 Ends, will coſt more than 16 Ends, the 4th Number will be greater than the 2d; therefore I multiply the 2d Number by 96, and Divide the Product by 16, and the *Quotient* is the *Anſwer* in Pence, which I reduce into Shillings and Pounds, and 'tis done.

This Queſtion alſo is *Direct*, becauſe more Cloth coſteth more Money.

N. B. The leaſt *Ratios* of Numbers being in the ſame proportion with thoſe Numbers, as was ſhewn in the general Definition, may be uſed in all Operations in this *Rule*, inſtead of the Numbers whoſe *Ratios* they are. So the leaſt *Ratio* of 16 to 96, is 1 to 6, therefore I ſtate and work the laſt Queſtion, as underneath.

	1	18 *l.*	16 *s.*	2 *d.*	6
				6	
Anſwer		112	17	0	

N. B. Alſo, that the *Rules* already given, and which we have now explained, were calculated for general Uſe, and correſpond very well with the method commonly uſed by Authors that have wrote on this ſubject; but according to the method which we intend to uſe, we ſhall many times deviate pretty much from them.

As Firſt, If the Firſt and Third Numbers be not both of one Denomination, yet if they, or their *Ratios* be commodious for Multiplying, and Dividing according to any of the *Varieties* already given in the *Multiplication* and *Diviſion*, there will be no occaſion for the *Reduction* mentioned in the *Rule*. The laſt Example and ſeveral that follow are ſufficient Proofs of this.

Secondly, Although the 2d Number be of one Denomination only, yet if it is to be Multiplied into the leſſer Extream, and that Product be leſſer than the greater Extream, and ſo *Diviſion* by the greater Extream be impoſſible, you muſt Reduce the ſecond to a lower Denomination, in order to render ſuch *Diviſion* poſſible.

EXAMPLE 3.

If 24 *C.* 2 *Q.* of Sugar coſt 18 *l.* what muſt I give for 1 *C. wt.* at that rate?

See the Operation.

```
24 C. 2 Q:          18          1 C.
    4               20          4
  ----            ----         ---
    98             360          4
                     4
                  ----
               98)1440(14 s. 8 d. 1 q. Answer
                  ----
                   460
                  ----
                    68
                    12
                  ----
                98)816(8
              --------
                    52
                     4
              --------
                98)128(1
                 ( 30/98 )
```

If I had Multiplied 18 *l.* by 4 *Q.* the Product 72 would have been too little to have been Divided by 98, therefore I was obliged to reduce 18 *l.* into Shill. that I might have a *Dividend* big enough to be divided by 98.

This Queſtion is *Direct*, for leſs Sugar will coſt leſs Money.

EXAMPLE 4.

If 1 *lb.* of Coffee coſt 9 *s.* what is that *per Oz.*?

16 *oz.* 9 *s.* 1 *oz.*
12
4)108
4)27-0 } ---12
6 3 }
4
4)48
4)12
3

Or by Compendiums in Diviſion thus.

4)9 *s.* 0 *d.*
4)2 3
Anſw. 6 *d.* 3 *q*

Anſwer 6 *d.* 3 *q.*

N. B. In the firſt of theſe two Queſtions the ſecond Number was Reduced into Shillings, therefore the *Quotient* is Shillings, and the *Remainder* is 68 parts of a Shilling, which I therefore multiply by 12, and Divide by the ſame *Diviſor*, *i. e.* 98, and the *Quotient* is 8 Pence, and the *Remainder* 32 is ſo many parts of a Penny, which I Multiply by 4, and Divide, and the *Quotient* is 1 Farthing, and 30 Remains, which I write over the *Diviſor* for the *Fraction* of a Farthing.

The ſecond Number in the laſt Queſtion is Reduced to Pence, therefore the *Remainder* 12 is part of a Penny, which I Multiply by 4, and Divide by 16, *i. e.* 4 and 4, and the *Quotient* is three Farthings, and nothing remains.

Theſe two Queſtions are both Direct, for leſs ſtuff will coſt leſs Money.

Thirdly, Queſtions may be, and often are ſo propoſed, as to have no words implying a Suppoſition, but the words which imply a demand, ſeem to govern all the Numbers in the *Queſtion.*

In this Caſe, I would adviſe the Learner to propoſe, or at leaſt ſuppoſe the Queſtion propoſed in another form of Words, beginning with that Number which is of the ſame kind with that about which the Queſtion is asked; and make it, and that Number with this of the ſame kind with the thing ſought the two Suppoſitions, by putting the word *If*, or *Suppoſe* before them, and that about which the Queſtion is asked the Demand, and then you will have it in a clearer light. As in the Queſtions following.

Example 4.

What is the Premium of Inſurance of 368 *l.* 12 *s.* 2 *d.* at 2 and a half *per Cent.*

Though this is a proper way enough of propoſing the Queſtion, yet it Clouds it with ſome Obſcurity, which may be prevented by another form of Words, as if it were thus propoſed.

If the Premium of Inſurance of 100 *l.* be 2 *l.* 10 *s.* what is the Premium of Inſurance of 368 *l.* 12 *s.* 2 *d.* at that rate?

See the OPERATION.

If 100   50   368 *l.* 12 *s.* 2 *d.*
240   20
24000   7372
12
88466
50
6,000)4423,300
4)737--1300 } 7300
2,0)18,4-1 } 12
9--4   6)87,600
4)14   3 } 15600
3   2 }   4
6)62,400
4)10   2 } 14400
2   2 } 24000

Anſw. 9*l.* 4*s.* 3*d.* 2*q.*

This Queſtion performed much nearer by the Ratio *of* 100 l. *to* 50 l. *which is* 40 *to* 1, *thus:*

40   1   8)368 *l.* 12 *s.* 2 *d.*
5)46   1   6 $\frac{1}{4}$ } $\frac{24}{80}$
Anſwer   9   4   3 $\frac{1}{2}$

Here I divide by 8 and 5, becauſe 8 times 5 is 40,

EXAMPLE 6.

What is the Commiſſion of 412 *l.* 16 *s.* 8 *d.* at 1 1 4*th per Cent.*?

This Queſtion I would thus propoſe.

If the Commiſſion of 100 *l.* be 25 *s.* what is the Commiſſion of 412 *l.* 16 *s.* 8 *d.*?

See the Operation.

If 100 *l.* 25 *s.* 412 *l.* 16 *s.* 8 *d.*
240 20
24000 8256
12
99080
25
495400
198160
6,000)2477,000
4)412-5
103-0 5000
5--3 12
6(60,000
4)10----0
2--2 12000
4
6)48,000
4(8
2

Anſw. 5 *l.* 3 *s.* 2 *d.* 2 *qrs.*

Or by the Ratio *of* 100 *l. to* 25 *s. which is* 80 *to* 1.

80 1 10)412 *l.* 16 *s.* 8 *d.*

8)41 5 8

Anſ. 5 3 $2\frac{1}{2}$

EXAMPLE 7.

What comes the Compoſition of 248 *l.* 12 *s.* 6 *d.* unto at 10 *s.* 6 *d. per* Pound?

This Queſtion may be thus ſtated.

If the Compoſition of 1 *l.* be 10 *s.* 6 *d.* what is the Compoſition of 248 *l.* 12 *s.* 6 *d.* at that rate?

See the Operation.

If 20 *s* 10 *s.* 6 *d.* 248 *l.* 12 *s.* 6 *d.*

12 2 20

240 21 4972

12

59670

21

6,0)125307,0

4)20884-30

4,0)522,1--0

Anſ. 130·10 $6\frac{3}{4}$

30

6

180

4

6,0)72,0

4)12

3

Here I Reduced the firſt and third Numbers both into Pence, and the ſecond only into Sixpences, and ſo I have the Anſwer in Sixpences. It would have ſaved ſome trouble, if I had reduced all the Numbers into Sixpences. But the Queſtion is capable of being much better done than either of thoſe ways, *thus :* Let the third Number remain in the Denomination it is in, and Reduce the 1ſt and 2d Numbers both into Sixpences, and they will be 40 and 21, ſo I muſt Multiply by 21, *i. e.* by 7 and 3, and Divide that Product by 40, or by 8 and 5; but the 8 which I ſhould Divide by, is an *Unit* more than the 7 which I am to Multiply by; therefore, I do not Multiply by the 7 at all, but Divide by 8, and becauſe the *Diviſor* 8 is an *Unit* more than the *Multiplier* 7, I Subtract the *Quotient* from 248 *l.* 12 *s.* 6 *d.* and that Remainder I Multiply by 3, and Divide the Product by 5, and the *Quotient* is the *Anſwer*.

See the Operation.

If 40 *Sixp.*	21 *Sixp.*	8)248 *l.*	12 *s.*	6 *d.*	0 *q.*
	Subtract	31	1	6	3
		217	10	11	1
				3	
		5)652	12	9	3
	Anſwer	130	10	6	3

N. B. It is many times difficult, eſpecially with thoſe that are but a little acquainted with the *Rule*, to determine preciſely the ſpecifical difference of the kinds of Numbers; for though they may agree in many conſiderable circumſtances, yet there may be ſome leſs principal and not eaſy to be diſcovered circumſtance, wherein they may differ, and which may be ſufficient to denominate the Numbers of different kinds. And this Obſervation is verified in an eminent degree in the three laſt *Examples*. For though all the three Numbers in each of them be *Sterling* Money, and ſo agree in one very eſſential property, yet they differ in another circumſtance, not much leſs material, though not quite ſo conſpicious. For in the firſt Example, notwithſtanding all the three Numbers are *Sterling* Money, yet only two of them are principal Money Inſured, and the other, which is of the ſame kind with the thing ſought, is *Premium*, or Reward of Inſurance.

And in the ſecond *Example*, tho' the 3 Numbers are Money, yet only two of them are Money which a Factor negociates for his Employer, and the other is what the Employer alloweth his Factor for Commiſſion, and is of the ſame kind with the thing ſought. So likewiſe in the third *Example*, the diſtinction is of *Debt* and *Compoſition*.

This Obſervation I hope may be of excellent uſe to a Learner, to prevent their being deceived with the firſt appearances of Numbers, which before Examination may ſeem to be of one kind, according to the intent of the *Rule*, but yet when they are diligently enquired into may be found to be really different.

Fourthly, There is another ſeeming deviation from, or rather contradiction of this *Rule*, which is, When four Numbers are given to find the *Anſwer* to the *Queſtion*; whereas the *Rule* ſaith there are always 3 Numbers given to find a 4th. And of theſe ſort of *Queſtions* there is great Variety. As,

1. There may be four Numbers given, and one of them may be ſuperfluous, and this term is always known by being twice mentioned, either Directly, or by ſome Word that refers to it.

EXAMPLE 8.

If Wine worth 12 *l.* be ſufficient for the Ordinary of 42 Men when the Tun is ſold at 8 *l.* 12 *s.* 6 *d.* what is the Tun ſold for when the ſaid 12 *l.* worth is ſufficient for 84 Men.

Here the ſuperfluous Number is 12 *l.* it being twice mentioned; and therefore, ſince it is both a Suppoſition and Demand, it will equally effect both *Multiplier* and *Diviſor*, and to cauſe no alteration in the *Operation*, and ſo may be omitted in the *Operation*. I do therefore proceed with the other three Numbers according to the *Rule*.

See the Work.

If 42 *Men* 8 *l.* 12 *s.* 6 *d.* 84
7
60 7 6 *Or by the laſt* Ratio *of* 42 *to* 84, *which is* 1 *to* 2.
6
12)362 5 0 1 8*l.* 12*s.* 6*d.* 2
7)30 3 9 2)4 6 3
Anſwer 4 6 3

EXAMPLE 9.

If when the Buſhel of Wheat is ſold for 5 *s.* 8 *d.* the Penny Loaf ought (according to the Statute) to weigh 12 *oz.* 8 *p. wt. Troy weight*, what ought it (*i. e.* the Penny Loaf) to weigh, when the Buſhel is ſold at 9 *s.* 4 *d.* ?

The ſuperfluous Number in this Queſtion is 1 Penny Loaf, known to be ſo by being once mentioned, and once underſtood; therefore I leave it out of the Operation, and proceed with the other 3 Numbers, thus:

```
If 5 s. 8 d.          12 oz. 8 p.wt.             9s. 4d.
    12                    20                       12
  ----                  ----                     ----
    68                   248                      112
                          68
                        ----
                        1984
                       1488                                    50
                       ----  Anſ. 7 oz. 10 p.wt. 13 gr.      ---
               4)16364                                        112
               -------
                 4)4216
               -------
                 7)1054
               -------
              2,0)15,0        64
               -------        24
                 7   10   -------
                          4)1536
                          ------
                           4)384
                          ------
                            7)96
                          ------
                           13-80
```

This Queſtion done by the leaſt *Ratio* of 68 to 112, which is 17 to 28.

17 12 *oz.* 8 *p. wt.* 28
4

49 12
4

4)210 16

7)52 14

7 10 13 $\frac{20}{28}$

Here I Multiply by 4, and that Product by 4, adding the 12 *oz.* 8 *p. wt.* into that Product as I Multiply; and that laſt Product I divide by 28, according to the *Rules* given in *Compendiums* in *Multiplication* and *Diviſion*; and the *Quotient* is the *Anſwer*.

Theſe two *Examples* are both *Inverſe.*

Example

EXAMPLE 10.

If I have 12 *C. wt.* carried 148 Miles for 5 *l.* 7 *s.* 8 *d.* what muſt I give to have 42 *C. wt.* carried the ſame way?

Here the ſuperfluous Number is 148 Miles; therefore omitting it, I proceed with the other 3 Numbers, thus:

If 12 *C.* 5 *l.* 7 *s.* 8 *d.* 42 *C.*
7

37 1 38
6

12)226 2 0

Anſwer *l.* 18 16 10

Or by the leaſt Ratio *of* 12 *to* 42, *which is* 2 *to* 7, *thus:*

2 5 *l.* 7. 8. 42
7

2)37 13 8

Anſwer l. 18 1610

This *Queſtion* is *Direct*, for it will coſt more to have 42 *C. wt.* carried than to have 12 *C. wt.* carried the ſame Number of Miles.

EXAMPLE 11.

If the *Intereſt* of 100 *l.* Principal for one Year, be 5 *l.* what is the *Intereſt* of 763 *l.* 11 *s.* 8 *d.* for the ſame time?

Here the ſuperfluous Number is one Year.

See the OPERATION.

If 100 *l.*	5 *s.*		763 *l.*	11 *s.*	8 *d.*
					5
		10)	3817	18	4
		10)	381	15	10
		Anſwer	38	3	7

Or by the leaſt Ratio *of* 100 *to* 5, i. e. 20 *to* 1.

20	1	2,0)	76,3 *l.*	11 *s.*	8 *d.*
		Anſwer	*l.* 38	3	7.

This *Queſtion* is *Direct*, for a greater Principal will gain more *Intereſt* in the ſame time.

2. There is ſometimes 4 Numbers given, and an *Operation* muſt be worked with 3 of them, and the Anſwer to that *Operation* muſt be Added to, or Subtracted from one of the other Numbers, and the Sum, or Difference will be the *Anſwer* to the *Queſtion*.

EXAMPLE

EXAMPLE 12.

If a Gentleman worth 500 *l. per Annum* expend daily, one Day with another 18 *s.* 4 *d.* what does he lay up at the Year's end.

Here it is plain, that I muſt find what he expends in the Year, before I can find what he layeth up; and then Subtract his Yearly Expences from his Yearly income, and the Remainder will be what he lays up at the Year's End.

See the Operation.

If 1 *Day*		18 *s.*	4 *d.*	365
	3	13	4	
	330	00	00	
	334	11	8	Yearly Expences.
	500	00	0	Yearly Income.
	165	08	4	Lays up at the year's End.

EXAMPLE 13.

If a Gentleman expend daily, one Day with another 18 *s.* 1 *d.* and at the end of a Year lay up 165 *l.* 8 *s.* 4 *d.* what is his Yearly income.

In this *Example* I muſt find what he ſpends in a Year, as in the laſt, and add the Anſwer to what he layeth up, and the Sum will be his Yearly Income.

See the OPERATION.

If 1 *Day*		18 *s.*	1 *d.*	365
	3	12	4	
	325	10	0	
	330	00	5	Yearly Expences.
	165	08	4	Lays up at the Year's End.
	495	08	9	Yearly income.

In theſe 2 *Examples* I Divide 365 into 3 parts, *viz.* 1, 4, and 360; ſo let the *Multiplicand* ſtand for the 1, and Multiply it by 4, and that Product by 9 or rather 90, becauſe 4 times 90 is 360, according to *Compendiums* in *Multiplication*; then the Sum of theſe two Products and the *Multiplicand* is the Yearly Expences.

3. Some times there are 4 Numbers, and we muſt take the Sum, or difference of ſome two of them, and with it, and the other two given Numbers, find the Anſwer to the Queſtion.

EXAMPLE 14

A Factor at *Paris* conſign'd to his Imployer at *London*, 64 Tuns of *French* Wine, which, with all charges till on Board coſt 4621 *l.* 18 *s.* 8 *d.* the Merchant paid at the Receipt thereof, for Freight, Cuſtom, and other Charges 124 *l.* 5 *s.* 4 *d.* what does it ſtand him in *per* Gallon?

Here I add theſe two Charges, *viz.* that in *France*, and that in *England* together for the total Charges, and make that Sum my ſecond Number.

See the Work.

	4621 *l.*	18 *s.*	8 *d.*		
	124	05	4		
If 64 Tuns	8)4746	04	0		1 Gallon.
	8)593	05	6		
	4)74	03	2	1/4	
	7)18	10	9	1/2	
	9)2	12	11	1/2	
Anſwer		5	10	1/2	

Firſt I Divide by 8 and by 8 for 64 Tuns, then by 4, becauſe 4 Hogſheads is 1 Tun, and then by 7 and 9, *i. e.* 63, becauſe 63 Gallons is 1 Hogſhead.

EXAMPLE 15

A Grocer bought 4 Tuns of Oyl, and gave for it 242 *l.* 11 *s.* 8 *d.* and it chanced to leak out 2 Hogſheads, 29 Gallons, how muſt he ſell the remainder *per* Gallon to loſe nothing by the Bargain ?

In this *Example* that which ran out being quite loſt, muſt be Subſtracted from the whole 4 Tuns, and the remainder muſt be the firſt Number in the Operation.

See the Work.

T. *H.* *G.*
4 0 0
0 2 29

3 1 34——242 *l.* 11 *s.* 8 *d.*——1 *Gall.*
4 20

13 4851
7 12

91 853)58220(68
9

853 7040 5 *s.* 8 *d.* 1 *q.*

216
4

864(1

11

EXAMPLE 16.

If a Gentleman worth 500 *l. per Annum* lays up at the Year's end 236 *l.* 16 *s.* 8 *d.* what does he expend daily one day with an other.

Here I ſubtract 236 *l.* 16 *s.* 8 *d.* from 500 *l.* and the remainder is his Yearly Expences.

See the OPERATION:

500 *l.*
Subtract 236 *l.* 16 *s.* 8 *d.*

If 365 *Days* 263 3 4 1 *Day*
20

365)5263(14
1613
153
12
1840(5
15 *Anſwer* 14 *s.* 5 *d.* $\frac{115}{365}$

Example

EXAMPLE 17.

Bought Cloth and ſold it again at 14 *s.* 7 *d.* 2 *q.* *per* Yard, and gain'd by it after the rate of 8 *l.* *per Cent.* what did it ſtand me in per *Yard*?

Here I add 100 *l.* and it's gain together for my firſt Number.

See the Operation.

If 108 *l.* 100 *l.* 14 *s.* 7 *d.* 2 *q.*

8

12)117 0

9)9 9

1 1

Anſwer 13 *s.* 6 *d.* 2 *q.* *per* Yard.

In this *Example* I multiply by 8, the difference between the 1ſt and 2d Numbers, and divide by 108, *i. e.* by 12 and 9, and becauſe the firſt Number is bigger than the ſecond, I ſubtract the *Quotient* from the third Number, and the remainder is the Anſwer.

Sometimes there are 4 Numbers given, and ſome two of them muſt be multiplied together, and their Produce muſt be one of the three Numbers in the Operation. And this always happeneth when one of the Numbers ſheweth the Length, Weight, *&c.* of an *Unit* of another Number, into which it muſt be multiplied, and that Product will be the whole Length, Weight, *&c.* of that other Number.

E X A M P L E 18.

One put out a certain Sum of Money, to receive *Simple Intereſt* for the ſame after the rate of 5 *l. per Cent. per Annum*, and at the end of one Year he received for *Principal* and *Intereſt* 500 *l.* 12 *s.* what was the Sum put out.

See the OPERATION.

```
If 105 l.      100 l.     500 l. 12 s.
    20                       20
  ----                      ----
  2100                     10012
                             100
                         ---------
                       7)10012,00
                         ---------
                        3)1430--2 ⎧
                         ---------⎨ 1600
                           476--2 ⎩   20
                                   -----
                               7)320,00
                               --------
                                3)45--5 ⎧
                               ---------⎨ 500
                                 15   0 ⎩  12
                                         -----
                                7)60,00
                               --------
                                3)8--4 ⎧ 1600
                                  2  2 ⎩    4
                                         -----
                                    7)64,00
                                   --------
                                    3)9--1 ⎧
                                   --------⎨ 100
                                      3  0 ⎩
```

Anſwer 476 *l.* 15 *s.* 2 *d.* 3 *q.*

In this *Example*, becauſe the laſt number, *viz* 500 *l.* 12 *s.* is both *Principal* and *Intereſt* by the Queſtion; therefore, I add 5 *l.* *Intereſt* to 100 *l.* *Principal*, and ſo my firſt Number is of the ſame kind with the third, as it ought to be.

The laſt by the Ratio *of* 105 *to* 100, i. e. 21 *to* 20, *thus:*

21	20	7)500 *l.*	12 *s.*	0 *d.*	0 *q.*
		3)71	10	3	3
	Subtract	23	16	9	0
	Anſwer l.	476	15	3	0

EXAMPLE 19.

If 1 *oz.* of Silver be worth 5 *s.* what is the value of 16 *Ingots*, each weighing 14 *oz.* 16 *p. wt.*

Here 14 *oz.* 16 *p. wt.* is the weight of one *Ingot*, therefore I reduce 14 *oz.* 16 *p. wts.* into *p. wts.* and multiply them into the number of *Ingots*, and that Product is the *p. wts.* in all the *Ingots*. *See the work.*

If 20 *p. wt.* — 5 *s.* — 16 *Ing.* { 14 *oz.* 16 *p. wts.*
20

296
16

4736
5

2,0)2368,0

2,0)118,4

59 4

Or working with the leaſt Ratio *it will ſtand thus:*

5 1 14 *oz.* 16 *p. wt.*
20

5)296

l. 59 4

Anſwer 59 *l.* 4 *s.*

The way of finding this *Ratio* is this, *viz.* the leaſt *Ratio* of 20 *oz.* to 5 *s.* is 4 to 1, and the leaſt *Ratio* of 4 to 16 *Ingots* is 1 to 4, but that I might have the Anſwer in Pounds I took the *Ratio* of 20 to 4, which is 5 to 1.

This by another Ratio *thus:*

1 4 14 *oz.* 16 *p. wt.*
4
l. 59 4

This is only the *Ratio* of 20 to 5 times 16, *i. e.* 20 to 80, which is 1 to 4.

EXAMPLE 20.

If I buy 12 Fodders of Lead, each weighing 19 *C.* and a half weight, and give for it after the rate of 12 *s.* 8 *d. per C. wt.* what does the whole ſtand me in at that rate?

See the Operation.

If 4 *Q.*	12 *s.* 8 *d.*	2 *Fodd.* }	19 *C.* 2 *Q.*
	234	}	4
		12)00	
12)400	2 10 8		78
	19 00 0	20)180	3
20)533-4	126 13 4		
		9	234
26--13	*l.* 148 04 0		

This Operation explained.

Having placed my numbers, I reduce one Fodder, *i. e.* 19 *C.* and a half into Quarters, and then, inſtead of multiplying thoſe Quarters by 12 Fodders, to bring all into Quarters, and Dividing by my 1ſt Number 4, I multiply by one fourth part of 12, *i. e.* 3, and it makes 234, and by that I multiply 12 *s.* 8 *d. per Compend.* and the Product is the Anſwer.

Theſe are the moſt conſiderable deviations from the general Rule that I have obſerved as yet to have met with; and tho' there may be others, yet, if what hath been ſaid be well underſtood, the Learner can hardly meet with any inſuperable difficulty in his Progreſs. I ſhall only add two *Examples* more, and ſo conclude this *Rule.*

EXAMPLE 21.

A Merchant at *London* conſign'd to his Factor at *Jamaica* 287 Cotton Ends, with orders to ſell them at 1 *l.* 8 *s.* 2 *d. per* End, and return the value, one half in Tobacco at 2 *l.* 12 *s. per C. wt.* the other half in Sugar at 16 *s.* 4 *d. per C. wt.* how much muſt the Factor return of each.

Firſt, I find what the Cotton Ends comes to, thus:

If 1 End   1 *l.* 8 *s.* 2 *d.*   287 Ends.

$$
\begin{array}{rrrr}
 & & & 7 \\
\hline
 & 9 & 17 & 2 \\
 & 394 & 06 & 8 \\
\hline
\frac{1}{2}) & 404 & 03 & 10 \\
\hline
 & 202 & 1 & 10
\end{array}
$$

Here inſtead of multiplying by 287, I multiply by 7, and that Product by 4, according to *Compendiums* in *Multiplication.*

Then

```
Then ſay, If 52 s.      1 C. wt.        202 l.  1 s. 10 d.
             12                           20
            -----                        -----
            624                          4041
                                           12
                                         -----
Tobac. 77 C. 2 q. 25 lb. 7 oz.    624)48502(77
                                      -----
                                       4822
                                      -----
                                        454
                                          4
                                      -----
                                  624)1816(2
                                      -----
                                        568
                                         28
                                      ------
                                  624)15904(25
                                       ------
                                        3424
                                       ------
                                         304
                                          16
                                       ------
                                   624)4864(7
                                       -----
                                        496
                                       -----
                                        624
```

Then for the Sugar I ſay,

If 16 *s.* 4 *d.* — 1 *C.* — 202 *l.* 1 *s.* 10 *d.*

```
If 16 s. 4 d.        1 C.        202 l. 1 s. 10 d.
   12                                20
  ----                              ----
  196                               4041
                                      12
                                    ----
                               196)48502(247
                                    ----
                                     930
                                    ----
                                    1462
                                    ----
                                      90
                                       4
                                   -----
                                196)360(1
                                    ----
                                     164
                                      28
                                    ----
                               196)4592(23
                                    ----
                                     672
                                    ----
                                      84
                                      16
                                    ----
                               196)1344(6
                                    ----
                                     168
                                    ----
                                      96
```

Sugar 247 *C.* 1 *q.* 23 *lb.* 6 *oz.*

E X.

EXAMPLE 22.

A Grocer bought 2 Cheſts of Sugar, one containing 16 *C.* 3 *q.* 14 *lb.* at 1 *l.* 8 *s.* 6 *d. per C. wt.* the other containing 18 *C.* 1 *q.* 18 *lb.* at 1 *l.* 1 *s.* 8 *d. per C. wt.* theſe he mixed together, what is that mixture worth *per C. wt.*

Firſt, find what each Cheſt coſt ſeverally, thus:

```
If 112 lb.        28 s. 6 d.        16 C. 3 q.  14 lb.
                      2              16
                 ---------           16                98
Sixpences            57            1698                 6
                                  ------             -----
                                   1890         112)588(5
                                     57             -------
                                  ------               28
                                  13230                 4
                                   9450             -------
                                 --------        112)112(1
                                4)107730            -------
                                ----------            (0)
                                4)26932--2 }      {
                                ---------- }  2   {
                                 7)6733--0 }      {
                                ---------- }      {98
                                 40)961--6 }      {
                                ---------- }      {
                                    24--1
The First Cheſt coſt
   24 l. 0 s. 11 d. 1 q.
```

For the ſecond Cheſt ſay.

If 112 *lb.* 21 *s.* 8 *d.* 18 *C.* 1 *q.* 18 *lb.*

12

260

18

18

1836

2052

260

112)533520(4763

855 2,0)39,6-11-0

712 19-16-11-½

Second Cheſt coſt 19 *l.* 16 *s* 11 *d.* 2 *q.*

400

64

4

112)256(2

32

Add							
16 *C.*	3 *q.*	14 *lb.*	24 *l.*	0 *s.*	11 *d.*	1 *q.*	
18	1	8	19	16	11	2	
35	0	22	43	17	19	3	112 *lb.*

If 35 *C.* 0 *q.* 22 *lb.*---43 *l.* 17 *s.* 10 *d.* 3 *q.*---112 *lb.*

```
 35              20
35            -----
3522            877
----             12
3942          -----
              10534
                  4
             ------
              42139
                112
          ---------
        3942)4719568(4)1197
              ------   ------
               7775   12)299-1
              ------   ------
               38336    24-11
              ------
                28588
               ------
                  994
               ------
                  394
```

Anſwer 1 *l.* 4 *s.* 11 *d.* 1 *q. per C. weight.*

The Proof of this RULE.

I Always prove the Operations in this *Rule*, by ſtating the *Queſtion* over again in this inverted order, *viz.* I make that which was the Demand in the *Queſtion*, the firſt Number in the *Proof*, and that which was the *Anſwer*, I make the ſecond Number, and that which was the firſt Number I now make the third, and work that Operation according to the *Rule*; and if the *Anſwer* to this *Queſtion* be the ſame with the ſecond Number in the *Queſtion* you are to prove, the work is right, otherwiſe not.

N. B. That if any thing remained in the *Queſtion*, you muſt reduce the 2d Number in the Proof to that Denomination of which that Remainder is a part, and add that Remainder into the Product of the ſecond Number and the extream.

Suppoſe I would prove the 3d *Example*, I wou'd write it thus.

If 1 *C. wt.* of Sugar coſt 14 *s.* 8 *d.* 1 *q.* what will 24 *C.* 2 *Q.* coſt at that rate? *See the Operation.*

If 4 *Q.* 14 *s.* 8 *d.* 1 *q.* 24 *C.* 2 *Q.*

12 4

176 98

4

705

98

5640

6345

30 *Remainder*

4)69120

4)17280

12)4320

2,0)36,0

l. 18

Anſwer 18 *l.* which was the ſecond Number in the *Queſtion*, and therefore the work muſt be true.

SECTION 10.

Golden RULE Double.

IN this *RULE* there are always Five Numbers given to find a Sixth; of theſe 5 Numbers, three always imply a *Suppoſition*, and two a *Demand*, and are known by the ſame words as in the *Single Rule*. Two of theſe *Suppoſitions* are of the ſame kind with the two *Demands*, and the other is of the ſame kind with the Number ſought.

Queſtions in this *Rule* are Divided into two Operations in the *Rule*, as followeth, *viz.*

Take one of the *Demands* which you pleaſe for the 3d Number in the 1ſt Operation, and the *Suppoſition* that is of the ſame kind with that *Demand* for the 1ſt Number, and the *Suppoſition* of the ſame kind with the Thing ſought for the 2d Number, and work that Operation as in the *Single Rule*; then make the Anſwer to this Operation, the 2d Number in the ſecond Operation, and the *Demand* that was left the 3d Number, and the other *Suppoſition* the 1ſt Number; and the Anſwer to that Operation is the Anſwer to the Queſtion.

For as much as moſt AUTHORS perform Queſtions in this *Rule* at one Operation, though I do not like it; yet, for their ſakes that may think otherwiſe, and becauſe I would not omit any thing that may be thought proper to be inſerted, I have given the following *Rules* from Dr. HARRIS's *Lexicon Technicum*.

I. Obſerve, that the given terms are 5, whereof 3 are conditional, and antecedent, or Suppoſitions, the other two Demands, and are conſequents anſwering ſome of the former Antecedents, inſomuch, that with the Anſwer, there will be as many Conſequents as Antecedents, which muſt match one another in the ſame Denomination exactly.

II. For the right placing the Queſtion, and Terms in it, the three terms of the conditional part are duly to be regarded; let that which is the principal cauſe of Loſs, or Gain, increaſe or decreaſe, action or paſſion, be put in the firſt place; and let that which betokeneth the ſpace, or diſtance of place, &c. be put in the ſecond place, and the remaining part in the third place; the conditional part being thus ſtated, the other 2 terms wherein the *Demand* lies, muſt be ſo placed under the former terms, that they may correſpond one with another.

RULE 1.

Then if the Blank, or place ſought fall under the third term, multiply the three laſt terms for a *Dividend*, and the two firſt for a *Diviſor*, and the *Quotient* gives the 6th term required.

RULE 2.

But if the Blank fall under the firſt, or ſecond terms, multiply the firſt, ſecond, and fifth terms for a *Dividend*, and the 3d and 4th terms for a *Diviſor*, the *Quotient* gives the Anſwer.

Theſe two *Rules* are admirably well demonſtrated by Mr. Ward, in his Young *Mathem. Guide*, *Page* 96 and 97.

EXAMPLE I.

If 100 *l. Principal* in 12 Months gain 5 *l. Intereſt*, what will 426 *l. Principal* gain in 42 Months at that rate?

l.	*l.*	*l.*	*m.*	*l.*	*s.*	*m.*
If 100	5	426	If 12	21	6	42
		5			7	
		1,00)21,30		2)149--2		
		20				
			Anſw.	74--11		
		1,00)6,00				

N. B. The ſecond Operation was performed by the *Ratio* of 12 to 42, *i. e.* 2 to 7.

This QUESTION explained.

Here 426 *l.* and 42 Months, are the two *Demands*; therefore I take one of them, *viz.* 426 *l.* for the third Number in the firſt Operation, and 100 *l.* being of the ſame kind, I make the firſt Number; and 5 *l.* which is of the ſame kind with the thing ſought, the 2d Number, and working that Operation, I make the Anſwer to it the ſecond number in the ſecond Operation; and 42 Months, which is the other *Demand* I make the third Number; and 12 Months which is of the ſame kind with it, the 1ſt Number; and then work that Operation, and the Anſwer to it is the Anſwer to the *Queſtion*.

This Queſtion performed at one Operation by Rule 1.

100 *l.* 12 *m.* 5 *l.*
426 42

426
5
2130
7
14910
6
12,00)894,60
74--660
20
12,09)132,00
11

100
12
1200 *Diviſor*

Anſwer 74 *l.* 11 *s.* 0 *d.*

This Operation explained.

The Number in the *Queſtion* which is the principal cauſe of Loſs or Gain is 100 *l.* (it being the very ſtandard of Intereſt) therefore I put it in the firſt place, and the Number denoting time is 12 Months, which I place in the ſecond place, and 5 *l.* which is the third conditional Number, I put in the third place, then I place the two Demands under their correſpondents, *viz.* 426 *l.* under 100 *l.* and 42 Months under 12 Months, and ſo the blank falls under the third place; therefore I Multiply the third, fourth, and fifth terms, continually one into another for a *Dividend*, and the firſt and ſecond for a *Diviſor*, according to the ſirſt *Rule*, and the *Quotient* which ariſeth by that *Diviſion* is the *Anſwer* to the *Queſtion.*

EXAMPLE 2.

What Principal will raiſe a Sum of 42 *l.* in 18 months, at the rate of 5 *l. per Cent. per Annum ?*

This *Queſtion* might have been thus propoſed: If 100 *l. Principal* in 12 months, gain 5 *l. Intereſt*, what *Principal* in 18 months will gain 42 *l. Intereſt ?*

See the Work.

	l.	*l.*	*l.*		*m.*	*l.*	*m.*
If	5	100	42	If	12	3)840	18
			100			280 *ſubtract*	
			5)4200	*Anſw.*		560 *l.*	
			840				

N. B. Inſtead of multiplying by 2, and Dividing by 3, which are the leaſt *Ratios* of 12 to 18, I divide by 3, and ſubtract according to *Compendiums.*

The ſame at one Operation.

100 *l.*	12 *m.*	5 *l.* }	42
	18	42 }	12
			504
			100
			9,0)5040,0
			Anſwer 560 *l.*

EXAMPLE 3.

If 8 Men in 7 Days can Mow 40 Acres of Graſs, how many Acres can 24 Men mow in 28 Days?

See the Operation.

	m.	*Acres*	*m.*		*D.*	*Acres*	*D.*
If	8	40	24	If	7	120	28
		3				4	
		120			*Anſwer*	480	*Acres.*

N. B. In the firſt Operation the leaſt *Ratio* of 8 to 24 is 1 to 3, therefore I multiply by 3, and in the ſecond Operation the leaſt *Ratio* of 7 to 28, is that of 1 to 4; ſo I only multiply by 4, and 'tis done.

This at one Operation by Rule 1.

8 *m.* 7 *D.* 40 *Ac.* }
24 28 }

28
24
672
40
8)2688 0
7)336 0

Anſwer 480 *Acres.*

EXAMPLE 6.

If Wine worth 32 *l.* be ſufficient for the ordinary of 12 Men, when the Tun is ſold for 24 *l.* what is the Tun ſold for when Wine worth 96 *l.* 12 *s.* is ſufficient for 124 Men?

See the Work.

```
If 32 l.        24 l.          4)96 l. 12 s.
                                  24    3 ſubtract
                               ----------------
        12 m.                     72    9        124 men.
                                        3
                               ----------------
                               31)217--7(7
                                        12
                                 -----------
                                   31)84(2
                                        22
Anſwer 7 l. 0 s. 2 d. 2 q. 26/31         4
                                   ---------
                                   31)83(2
                                   ---------
                                        26
```

In the firſt Operation, the leaſt *Ratio* of 32 to 24 is that of 4 to 3; therefore I Divide by 4, and ſubtract; and in the ſecond Operation, the *Ratio* of 12 to 124 is 3 to 31; therefore I multiply by 3, and Divide by 31, and 'tis done.

This at one Operation by Rule 2.

12 m.	24 l.	32 l.	} 124	96 l. 12 s.
124		96-12	} 8	6
			992	579-12
			4	4
Answ. 7 l. 0 s 2d.2q.			3968	2318-8

12

3968) 27820-16(7

44

20

896

12

3968)10752(2

2816

4

3968)11264(2

333

EXAMPLE 5.

What Principal in 44 months will gain 42 *l.* 12 *s.* 6 *d.* *Simple Intereſt*, being computed after the rate of 5 *l.* *per Cent.* *per Ann.*

See the Operation.

If 5 *l.* 100 *l.* 42 *l.* 12 *s.* 6 *d.*
20

If 12 *m.* 11) 852 10 00 44 *m.*

77 10 00
3

Anſwer 232 10 00

Here I multiplied by 20 in the firſt Operation, becauſe the leaſt *Ratio* of 5 to 100 is that of 1 to 20; and in the ſecond I multiply by 3, and divide by 11, becauſe the *Ratio* of 12 to 44, is 3 to 11.

This performed at one OPERATION.

100 *l.* 12 *m.* 5 *l.* { 42 12 6
44 42 12 6 12

511 10 0
10

44 5115 00 0
5 10

22,0) 5115,0 00 0

Anſwer *l.* 232 10 0

EX-

EXAMPLE 6.

In what time will 232 *l.* 10 *s.* *Principal* gain 42 *l.* 12 *s.* 6 *d* *Intereſt* being computed at 5 *l.* *per Cent.* *per Annum.*

See the Work.

```
If 5 l.          12 m.          42 l. 12 s. 6 d.
 240                               20
----                             ----
1200                              852
                                   12
                                 ----
                                10230
                                   12
                                -----
                        12,00)1227,60
                                -----
                             102---360
                                    30
                                ------
                          12,00)108,00
If 100 l.        102---9        232 l.  10 s.
       2              30          2
   -----            ----        ----
     200            3069         465
                     200
               ---------
          465)613800(3,0)1320
              -------
                465
                ----
                1488
                ----
                 930   Answer 44 Months.
                ----
                  00
```

The ſame at one Operation per Rule 2.

```
  100 l.        12 m.          5 l.
  232   10                    42   12   6
   20                         20
 ------                      --------
  4650                        852
    12                         12
 ------                      --------
 55800                        10230
     5                          100
 ------                      --------
279000                        1023000
                                12
                             --------
               279,000)12276,000(44 m.
                      ---------
                        1116
                      ------
                        (0)
```

Example

EXAMPLE 7.

If the carriage of 56 *C. wt.* 12 miles coſt 14 *l.* what will the carriage of 24 *C. wt.* coſt, being carried 32 miles at that rate? *See the Work.*

If 56 *C.*	14 *l.*	24 *C.*
If 12 *m.*	5	2) 32 *m*
	Anſwer	*l.* 16

This at one Operation per Rule 1.

56 *C.*	12 *m.*	14 *l.*
24	32	
	14	

56 448
12 24

672)10752(16 *l.*

4032

(0)

SECTION II.

PRACTICE Rules.

IN the *Single Rule of Three Direct*, when the firſt term is an *Unit* or 1, that Queſtion may many times be much readier reſolved by another kind of Operation call'd *PRACTICE*; which is of excellent Uſe amongſt Merchants and others concern'd in Trade, by reaſon of its ſpeedy anſwering ſuch ſort of Queſtions: And in order to that the following *Tables* are ſubſervient.

Beſides, the way of working *Practice* by the *Aliquot* parts of a Pound, which is now pretty well known; there is alſo another way by the *Aliquot* parts of two Shillings, which is but little known, and is in many inſtances preferrable to the other way, eſpecially in eaſy finding the value of Remainders when we Divide by the *Aliquot* parts, and when we work for the parts of an *Integer*.

Now, that we may have an adequate notion of *Practice*, we muſt (if we work by the *Aliquot* parts of a Pound) imagine the *Integers* to be ſo many Pounds; which they would really be if each *Integer* coſt juſt one Pound; and then it will be natural to conceive, that the ſame *Integers*, at any other Price the *Integer*, muſt coſt ſuch a part of thoſe *Integers* as the Price of one is of a Pound; and therefore ſuch a part of thoſe *Integers* muſt be taken for the value of them.

Alſo, if we work by the *Aliquot* part of Two Shilling, we muſt imagine the *Integers* to be ſo many Two Shillings, for the Reaſon above; and then take ſuch a part of thoſe *Integers* for the Anſwer, as the Price is of Two Shillings.

Now ſuppoſe any *Integers*, *e. g.* 763. were ſold at Two Shillings *per* Piece; ſince Two Shillings is 1 Tenth part of a Pound, we muſt take 1 Tenth part of the *Integers*, *i. e.* we muſt Divide the *Integers* by 10, and it will be 76,3. *i. e.* 76 *l.* and 3 tenth parts of a Pound; but 1 tenth part of a Pound is 2 *s.* therefore 3 tenth parts muſt be 3 times 2, *i. e.* 6 *s.* and ſo the Anſwer will be 76 *l.* 6 *s.* hence for working by the *Aliquot* parts of 2 *s.* this is a general *Rule*; Double the *Units* Figure, and ſet it down remote from the other Figures towards the Right Hand for Shillings, and the other Figures are Pounds; and this Reduces the *Integers* to other *Integers* that are 2 *s.* each; then take ſuch Parts of thoſe *Integers* as your Price is of 2 *s.* for the Anſwer.

N. B. When I apply the Word *Integers* to 2 *s.* I always mean the given *Integers* brought into theſe of 2 *s.* each by this *Rule*.

I did at firſt intend to have handled theſe two ways of working *Practice* together, making one the Proof of the other; but finding a great many inſtances wherein the ſame *Example* will not fall under the ſame caſe in both, I thought it better to treat them apart, and to begin with the *Aliquot* parts of a Pound.

Aliquot parts of a Pound.

For d	Take	of
1/4	1/8	1/120
1/2	1/8	1/60
3/4	1/4	1/80
1	1/2	1/120
1 1/2	1/8	1/20
2	–	1/120
2 1/2	1/8	1/12
3		1/80
3 3/4	1/8	1/8
4	–	1/60
5	1/4	1/12
6	–	1/40
7 1/2	1/4	1/3
8	–	1/30
10	1/2	1/12
1 s. 0 d	–	1/20

Aliquot parts of a Shilling

For d.	Take
1	1/12
1 1/2	1/8
2	1/6
3	1/4
4	1/3
6	1/2

parts of a pound continu'd

s.	d.	Take	of
1	3	1/4	1/4
1	4	1/3	1/5
1	8		1/2
2	0		1/10
2	6		1/8
3	4		1/6

Practice does naturally Divide itſelf into ſeveral Caſes, which I ſhall conſider in ſuch order as to me ſeems to be moſt conducing to a right underſtanding the ſaid *Rule*; and in order to that I ſhall begin with,

CASE 1.

When the Price is any Aliquot part of a Pound.

RULE.

Divide the *Integers* by the *Denominator* of ſuch *Aliquot* parts, and the *Quotient* will be Pounds, and the *Remainder* is ſo many ſuch parts of a Pound, as the *Denominator* of the part denotes. As if you take 1 80th, the *Remainder* is ſo many Eightieth parts of a Pound, *i. e.* ſo many 3 *d*; or if you take 1 60th, the *Remainder* is ſo many Sixtieth parts, or 4 Pences, *&c.* and theſe *Remainders* muſt be reduced into Shillings, by Dividing them by ſo many of thoſe parts as makes a Shilling, as if they be 3 Pences, they muſt be Divided by 4, becauſe 4 Three-Pences is one Shilling, *&c.* and that *Quotient* will be Shillings, and the *Remainder* 3 Pences.

EXAMPLES.

$\frac{1}{120}$,)769,3 *lb.* at 1 *q. per lb.*
$\frac{1}{8}$)64 2 2
l. 8 0 3

Firſt, I Divide the *Integers* by 120, and the *Quotient* is Pounds, and there remains 13 Two-pences, or 2 *s.* 2 *d.* this I divide by 8, and the *Quotient* is 8 *l.* 0 *s.* 3 *d.* 1 *q.* for the *Anſwer.*

8)2429 *Yards at* 3 *q.*
4)30 7 3
l. 7 11 9 $\frac{3}{4}$

Firſt, I Divide by 80, becauſe 80 Three-pences is 1 *l.* and there remains 29 3 Pences, or 7 *s.* 3 *d.* this I divide by 4, becauſe 4 3 *q.* is 3 *d.* and the *Quotient* is 7 *l.* 11 *s.* 9 *d.* 3 *q.* for the Anſwer.

12)869 at 2 *d.* 2 *q.*
$\frac{1}{8}$)72 8 4
l. 9 1 0 $\frac{1}{2}$

Here I Divide by 12, becauſe 12 20 Pences is 1 *l.* and there remains 5 20 *d.* or 8 *s.* 4 *d.* and the *Quotient* I Divide by 8, becauſe 8 2 *d.* 2 *q.* is 20 *d.* and that *Quotient* is 9 *l.* 1 *s.* 0 *d.* 2 *q.* for the Anſwer.

$\frac{1}{8}$)781 *Yards of Galloon at* 3 *d.* 3 *q.*
$\frac{1}{8}$)97 12 6
l. 12 4 0 $\frac{3}{4}$

Firſt, I take 1 8th, becauſe 8 half Crowns is 1 *l.* and the remainder is 5 half Crowns, or 12 *s.* 6 *d.* then I take 1 8th of the laſt, becauſe 8 times 3 *d.* 3 *q.* is one half a Crown, and the *Quotient* is 12 *l.* 4 *s.* 0 *d.* 3 *q.*

EX-

$\frac{1}{40}$)769 *lb.* *of* Sugar *at* 6 *d.*

l. 19 4 6

$\frac{1}{4}$)687 at 15 *d.*

$\frac{1}{4}$)171 15 0

l. 42 18 9

$\frac{1}{6}$)431 at 3 *s.* 4 *d.*

l. 71 16 8

$\frac{1}{8}$)497 at 7 *d.* 2 *q.*

$\frac{1}{4}$)62 2 6

l. 15 10 7 $\frac{2}{1}$

$\frac{1}{12}$)673 at 20 *d.*

l. 56 1 8

$\frac{1}{3}$)371 at 6 *s.* 8 *d.*

l. 123 13 4

CASE 2.

If the Price be a Multiple *of ſome* Aliquot *part of a Pound, that is, contain ſome* Aliquot *part of a Pound, ſome certain number of times, or is a* Fraction *of a Pound, whoſe numerator is more than an* Unit.

RULE.

Multiply the *Integers* by the *Numerator* of the ſaid *Fraction*, and Divide that Product by the *Denominator*, and the *Quotient* is the Anſwer.

Or, Divide the *Integers* by the *Denominator*, and Multiply the *Quotient* by the *Numerator*, and the Product is the Anſwer.

Here followeth a TABLE *of the* Multiples *of a Pound.*

Parts	*Mul.*	*Parts*	*Mul.*	*Part*	*Mult.*
0 *s* 9*d*	3/80	7 6	3/8	16 8	5/6
1 2	7/120	8 4	5/12	17 6	7/8
1 6	3/40	8 9	7/16	18 4	11/12
1 10	11/12	11 3	9/16	3 0	3/20
2 4	7/60	12 6	5/8	7 0	7/20
2 8	4/30	13 4	2/3	9 0	9/20
3 9	3/16	13 9	11/16	11 0	11/20
6 3	5/16	15 0	3/4	17 0	17/20

N. B. There are many more *Multiples* of a Pound than theſe in the Table; ſome of which I have not perhaps yet diſcovered, and others have either their *Numerators* or *Denominator* ſo large, as to render them unfit for uſe.

EXAMPLES.

397 Ells at 9 *d.* *per* Ell.
3
$\frac{1}{80}$)1191
l. 14 17 9

Or thus,
$\frac{1}{80}$)397 at 9 *d.*
4 19 3
3
l. 14 17 9

363 at 18 *d.*
3
$\frac{1}{4,0}$)138,9
l. 34 14 6

Or thus,
$\frac{1}{4,0}$)46,3 at 18 *d.*
11 11 6
3
l. 34 14 6

219 *lb.* at 6 *s.* 3 *d.*
5
$\frac{1}{4}$)1095
$\frac{1}{4}$)273 15 0
l. 68 8 9

Or thus,
$\frac{1}{4}$)2190
$\frac{1}{8}$)547 10
l. 68 8 9

561 *lb.* at 14 *d.* *per lb.*
7
$\frac{1}{12,0}$)392,7
l. 32 14 6

Or thus,
$\frac{1}{12,0}$)561 at 14 *d.*
4 13 6
7
l. 32 14 6

417 at 21 *d*
7

$\frac{1}{8,0}$)291,9

l. 36 9 9

Or thus,

$\frac{1}{8,0}$)41,7 at 21

5 4 3
7

l. 36 9 9

261 at 8 *s.* 9 *d.*
7

$\frac{1}{4}$)1827

$\frac{1}{4}$)456 15 0

l. 114 3 9

Here I add a Cypher to the Right Hand of the *Integers*, and Divide by 2 times 16, *i. e.* 32, or 4 and 8.

Thus:

$\frac{1}{4}$)2190

$\frac{1}{8}$)547 18 0

l. 68 8 9

123 at 18 *s.* 4 *d.*
11

$\frac{1}{12}$)1353

l. 112 15 0

Or thus,

$\frac{1}{12}$)123
10 5 0 *Subtract*

l. 7 7 11 1*q.*

141 at 16 *s.* 8 *d.*
5

$\frac{1}{6}$)705

l. 117 10 0

Or thus,
$\frac{1}{6}$)141 at 16 *s.* 8 *d.*
23 10 0 *ſubtract*

l 117 10 0

Or thus,
141 at 16 *s.* 8 *d.*

$\frac{1}{12}$)1410

l. 117 10 0

CASE 3.

If the Price be either the ſum or difference of an Ali*quot part of a Pound, and an* Aliquot *part of that* Aliquot *part.*

RULE.

Divide the *Integers* by the *Denominator* of the *Aliquot* Part of a Pound, and Divide the *Quotient* by the *Denominator* of the other *Aliquot* part, and the Sum or Difference of thoſe two *Quotients* is the Anſwer.

EXAMPLES.

$\frac{1}{12,0}$)78,9 Nutmegs *at* 2 *d.* 1 *q.*

$\frac{1}{8}$)6 11 6
0 16 $5\frac{1}{4}$

l. 7 7 11 4

First, I take 1 120 of the *Integers* for 2 *d.* and 1 8th of that *Quotient* for 1 Farthing, and I add theſe two *Quotients* together, and the Sum is the Anſwer.

$\frac{1}{8,0}$)57,3 at 3 *d.* 2 *q.*

$\frac{1}{6}$)7 3 3
1 3 10$\frac{1}{2}$

l. 8 7 1$\frac{1}{2}$

Firſt, I take 1 80th of the *Integers* for 3 *d.* and 1 6th of that for a Half-penny, and the Sum of thoſe two *Quotients* is the Anſwer.

$\frac{1}{4,0}$)73,1 at 6 *d.* 3 *q.*

$\frac{1}{8}$)18 5 6
2 5 8$\frac{1}{4}$ Add

l. 20 11 2$\frac{1}{4}$

$\frac{1}{4,0}$)73,1 at 5 *d.* 1 *q.*

$\frac{1}{8}$)18 5 6
2 5 8$\frac{1}{4}$ *ſubtr.*

l. 15 19 9$\frac{3}{4}$

In theſe two *Examples* the *Integers* are the ſame in both, and the Prices are equally diſtant from 6 *d.* one 3 4ths of a Penny above, and the other 3 4ths of a Penny below; but 3 4th of a Penny is 1 8th part of 6 *d.* therefore I take 1 40th of the *Integers* for 6 *d.* and 1 8th of that for 3 *q.* and in the firſt Example I add the two *Quotients* together, and in the latter I take the latter *Quotient* from the former, and the Sum in one caſe and the Difference in the other is the Anſwer.

$\frac{1}{4}$)649 at 5 *s.* 5 *d.*

$\frac{1}{12}$)162 5 0
13 10 5 Add

l. 175 15 5

$\frac{1}{4}$)649 at 4 *s.* 7 *d.*

$\frac{1}{12}$)162 5 0
13 10 5 *ſubtract*

l. 148 14 7

$\frac{1}{2,0}$)68,9 lb. at 13 *d.* 2 *q.*

$\frac{1}{8}$) 34 9 0
4 6 1$\frac{1}{2}$ *Add*

l. 38 15 1$\frac{1}{2}$

$\frac{1}{20}$)689 at 10 *d.* 2 *q.*

$\frac{1}{8}$)34 9 0
4 6 1$\frac{1}{2}$ *ſubtract*

l. 30 2 10$\frac{1}{2}$

In theſe two *Examples* the *Integers* are the ſame in both, and the Price in the firſt of which is 1 *d.* 2 *q.* *i. e.* 1 8th of a ſhilling above, and in the latter it is 1 *d.* 2 *q.* or 1 8th under a ſhilling; ſo that I take 1 20th for the ſhilling, and 1 8th for 1 *d.* 2 *q.* and the Sum of theſe two *Quotients* in the former, and their difference in the latter is the Anſwer.

$\frac{1}{2}$)617 at 10 *s.* 10 *d.*

$\frac{1}{12}$)308 10 0
25 14 2 *Add*

l. 334 4 2

$\frac{1}{2}$)617 at 9 *s.* 2 *d.*

$\frac{1}{12}$)308 10 0
25 14 2 *ſubtract*

l. 272 15 10

CASE 4.

If the price be the Sum or Difference of two Aliquot *parts of a* Pound.

RULE.

Divide the *Integers* by the *Denominators* of thoſe parts, one after another, and the Sum or Difference of thoſe two *Quotients* is the Anſwer.

EXAMPLES.

$\frac{1}{30}$)627 *Ells at* 11 *d.*

$\frac{1}{80}$)20 18 0
7 16 9 *Add*

l. 28 14 9

Firſt I take the 1 30th for 8 *d.* and then 1 80th for 3 *d.* both out of the *Integers*; and becauſe 8 *d.* and 3 *d.* is 11 *d.* therefore the ſum of theſe two *Quotients* is the Anſwer.

$\frac{1}{10}$)463 at 2 *s.* 3 *d.*

$\frac{1}{80}$)46 6 0
5 15 9

l. 52 1 9

$\frac{1}{4}$)419 at 5 *s.* 4 *d.*

$\frac{1}{60}$)104 15 0
6 19 8 *Add*

l. 111 14 8

$\frac{1}{2}$)261 at 10 *s.* 6 *d.*

$\frac{1}{40}$)130 10 0
6 10 6

l. 137 0 6

$\frac{1}{10}$)463 at 1 *s.* 9 *d.*

$\frac{1}{80}$)46 6 0
5 15 9 *ſubtract*

l. 40 10 3

$\frac{1}{4}$)41,9 at 4 *s.* 8 *d.*
$\frac{1}{6,0}$)104 15 0
6 19 8 *ſub.*
l. 97 15 4

$\frac{1}{2}$)26,1 at 9 *s.* 6 *d.*
$\frac{1}{4,0}$)130 10 0
6 10 6 *ſub.*
l. 123 19 6

$\frac{1}{12}$)489 *lb.* at 17 *d.*
$\frac{1}{80}$ 40 15 0
6 2 3 *ſubtract*
l. 34 12 9

Here I take 1 12th for 20 *d.* and 1 80th for 3 *d.* and ſubtract the latter *Quotient* from the former, and the *Remainder* is the Anſwer.

CASE 5.

If the Price be the Sum or Difference of ſome Aliquot *part of a Pound, and an* Aliquot *part of ſome other* Aliquot *part of a Pound.*

RULE.

Take for the two *Aliquot* parts of a Pound, as in the laſt, and Divide the *Quotient* belonging to that part of which the third *Aliquot* part is a part, by the *Denominator* of that 3d part, then the Sum or Difference of that *Quotient*, and the *Quotient* belonging to that part of which the 3d part is not a part is the Anſwer.

Examples

EXAMPLES.

$\frac{1}{80}$)263 at 4 *s.* 0 *d.* 2 *q.*
$\frac{1}{5}$) 3 5 9
$\frac{1}{6}$) *Add* 10 11$\frac{1}{2}$
52 12 0
l. 53 2 11$\frac{1}{2}$

$\frac{1}{80}$)263 at 3 *s.* 11 *d.* 2 *q.*
$\frac{1}{5}$ 3 5 9
$\frac{1}{6}$ *ſubtr.* 10 11$\frac{1}{2}$
52 12 0
51 1 0$\frac{1}{2}$

In theſe two Examples I take 1 80th for 3 *d.* and 1 6th of that for 2 *q.* then I take 1 5th of the *Integers* for 4 *s.* the Sum of theſe two laſt *Quotients* in the firſt, and their Difference in the 2d *Example is the* Anſwer.

$\frac{1}{80}$)121 at 10 *s.* 1 *d.*
$\frac{1}{2}$ $\frac{1}{3}$ 1 10 3
Add 10 1
60 10 0
l. 61 0 1

$\frac{1}{80}$)467 at 20 *d.* 3 *q.*
$\frac{1}{12}$ $\frac{1}{4}$ 5 16 9
Add 1 9 2 $\frac{1}{4}$
38 18 4
l. 40 7 6 $\frac{1}{4}$

$\frac{1}{120}$)429 at 2 *s.* 0 *d.* 1 *q.*
$\frac{1}{10}$ $\frac{1}{8}$ 3 11 6
8 11 $\frac{1}{4}$
42 18 0
l. 43 6 11 $\frac{1}{4}$

$\frac{1}{80}$)121 at 9 *s.* 11 *d.*

$\frac{1}{2}$ $\frac{1}{3}$ 1 10 3

ſubtract 10 1

60 10 0

l. 59 19 11

$\frac{}{80}$)467 at 19 *d.* 1 *q.*

$\frac{1}{12}$ $\frac{1}{4}$ 5 16 9

ſubtra. 1 9 2 1

38 18 4

l. 37 9 1 3

$\frac{1}{120}$)429 at 1 *s.* 11 *d.* 3 *q.*

$\frac{1}{10}$ $\frac{1}{8}$ 3 11 6

8 11 1

42 18 0

l. 42 9 0 3

CASE 6.

If the price be the ſum or difference of ſome Multiple *of an* Aliquot *part of a Pound, and an* Aliquot *part of the ſaid* Aliquot *part.*

RULE.

Work for the *Multiple* as was directed in the latter part of the *Rule* in *Caſe* 2, and for the *Aliquot* part as in *Caſe* 1, and the Sum or difference of thoſe 2 Sums is the Anſwer.

EXAMPLES.

$\frac{1}{80}$)763 *oz. at* 9 *d.* 1 *q.*

$\frac{1}{12}$ 9 10 9

3

28 12 3

0 15 10 3 *add*

l. 29 8 1 1 1

0 3

$\frac{1}{120}$	)469 at 16 *d.* 1 *q.*			
$\frac{1}{8}$	3	18	2 8	
	31	5	4	
Add		9	9	1
l.	31	15	1	1

$\frac{1}{80}$	)483 at 18 *d.* 1 *q.*			
$\frac{1}{12}$	)6	0	9 6	
	36	4	6	
Add	10	0	3	
l.	36	14	6	3

$\frac{1}{80}$	)763 *oz.* *at* 8 *d.* 3 *q.*			
$\frac{1}{12}$	)9	10	9 3	
	28	12	3	
	0	15	10 $\frac{3}{4}$	*ſubtr.*
	27	16	4 $\frac{1}{4}$	

$\frac{1}{120}$	)469 at 15 *d.* 3 *q.*			
$\frac{1}{8}$	)3	18	2 8	
	31	5	4	
ſubt.		9	9	
l.	30	15	6 $\frac{3}{4}$	

$\frac{1}{80}$	)483 at 17 *d.* 3 *q.*			
$\frac{1}{12}$	)6	0	9 6	
	36	4	6	
	10	0	3	*ſubtract*
l.	35	14	5	1

In the firſt and ſecond *Examples*, I take 1 80th for 3 *d.* and the *Quotient* I multiply by 3, that Product is for 9 *d.* then 1 12th of that which is for 3 *d.* I take for 4 *d.* and in the firſt I add, and in the ſecond Example I ſubtract.

$\frac{1}{80}$)387 at 21 *d.* 1 *q*

$\frac{1}{12}$	4	16	9	
			7	
	33	17	3	
Add		8	0	3
l.	34	5	3	3

$\frac{1}{80}$)419 at 20 *d.* 3 *q*

$\frac{1}{12}$)	5	4	9	
			7	
	36	13	3	
ſubtr.		8	8	3
l.	35	4	6	1

CASE 7.

If the price be the ſum of three Aliquot *parts, viz. the firſt an* Aliquot *part of a Pound, the ſecond an* Aliquot *part of the firſt, and the third an* Aliquot *part of the ſecond.*

RULE.

Take the firſt *Aliquot* part out of the *Integers*, the ſecond out of the firſt, and the third out of the ſecond, &c. the Sum of thoſe three *Quotients* is the Anſwer.

EXAMPLES.

$\frac{1}{40}$)673 at 7 *d.* 1 *q.*

$\frac{1}{6}$)	16	16	6	
$\frac{1}{4}$	2	16	1	
		14	0	1
l.	20	6	7	1

Firſt I take 1 40th for 6 *d.* and 1 6th of that *Quotient* for 1 *d.* and 1 4th of that for 1 *q.* and the Sum of thoſe three *Quotients* is the Anſwer.

1/10)	763 at 2 s. 2 d. 1 q.			
1/12)	76	6	0	
1/8	6	7	2	
		15	10	3
l.	83	9	0	3

Firſt I take 1 10th of the *Integers* for 2 *s.* then 1 12th of that for 2 *d.* and 1 8th of that for 1 4th, and ſo Add for the Anſwer.

1/40)	637 at 7 *d.* 3 *q.*			
1/4)	15	18	6	
1/6)	3	19	7	2
		13	3	1
l.	20	11	4	3

Here I take 1 40th of the *Integers* for 6 *d.* 1 4th of that for 1 *d.* 2 *q.* and 1 6th of that for 1 *q.* and adds them together for the Anſwer.

1/4)	683 at 5 *s.* 6 *d.* 1 *q.*			
1/12)	170	15	0	
1/4)	14	4	7	
	3	11	1	3
l.	188	10	8	3

Firſt, I take 1 4th of the *Integers* for 5 *s.* and 1 12th of that for 5 *d*, and 1 4th of that for 1 *d.* 2 *q.* then Add for the Anſwer.

CASE 8.

If the Price be an even Number of Shillings.

RULE.

Multiply the *Integers* by half the Number of Shillings, ſetting the double of the *Units* Figure for Shillings.

EXAMPLES.

137 *Yards* at 6 *s.*
3

l. 41 2

173 *lb. at* 12 *s.*
6

l. 103 16

In this *Example*, I Multiply the Yard by 3, half the Number of Shillings, ſaying three times 7 is 21, I double the 1, and it makes 2 *s.* which I ſet down and carry 2; then, 3 times 3 is 9, and 2 I carry is 11, ſet down 1 and carry 1, then 3 times 1 is 3, and 1 is 4, which I ſet down, and the Anſwer is 4 l. 2 s.

129 *Ells at* 8 *s.*
4

l.51 12

167 *oz. at* 16 *s*
8

l.133 12

In this laſt *Example* I multiply by 8. the half of 16, ſaying 8 times 7 is 56, I double the 6 and it makes 12, which I ſet down and carry 5; then 8 times 6 is 48, and 5 is 53, ſet down three and carry 5; then 8 times 1 is 8, and 5 I carry is 13, which I ſet down, and the Anſwer is 133 *l.* 12 *s.*

CASE 10.

If the price be any odd number of Shillings.

RULE.

Multiply the given *Integers* by the Number of Shillings, and Divide the Product by 20 for the Anſwer.

EXAMPLES.

241 *Gal. at* 7*s.*	187 *oz. at* 13 *s.*
7	13
2,0)168,7	2,0)243,1
l. 84 7	*l.* 121 11 0
173 at 17 s.	161 at 19 s.
17	19
2,0)294,1	2,0)305,9
l. 147 1 0	*l.* 150 19 0

CASE 10.

If the Price be one Pound *with ſome Number of* Shillings *and* Pence.

RULE.

Work for the Shillings and Pence by ſome of the preceding *Rules*, and add the *Integers* in for one Pound, and that ſum will be the Anſwer.

EXAMPLES.

1)373 at 1 *l.* 2 *s.* 6 *d.*
8 46 12 6

l. 419 12 6

In this I take 1 8th of the *Integers* for 2 *s.* 6 *d.* to that *Quotient* I add the *Integers* for 1 *l.* and the ſum is the Anſwer.

1)243 at 1 *l.* 6 *s.* 6 *d.*
5 48 12 0
1
8 30 07 6

l. 321 19 6

Here I take 1 5th for 4 s. and 1 8th for 2 *s.* 6 *d.* both out of the *Integers*, and add theſe 2 ſums and the *Integers* for the Anſwer.

1)217 *C.* at 1 *l.* 4*s.* 3*d.*
5 43 8 0
1
80 2 14 3

l. 263 2 3

In this I take 1 5th for 4 *s.* and 1 80th for 3 *d.* both out of the *Integers*; the ſum of thoſe 2 *Quotients* and the *Integers* is the Anſwer.

1)139 at 1 *l.* 9 *s.* 4 *d.*
6 41 14
23 3 4

l. 203 17 4

Firſt I multiply the *Integers* by 3 for 6 *s.* and then I take 1 6th for 3 *s.* 4 *d.* the ſum of theſe 2 & the *Integers* is the *Anſ.*

N. B. *If the price be ſome number of* Pounds, *with* Shillings, Pence and Farthings.

RULE.

Multiply the *Integers* by the number of Pounds and then proceed as before.

EXAMPLES.

```
2,0)16,5 at 3l. 1s. 1d. 2q.
        3
   ---------
      495
1       8  5
-
8       1  0  7  2
   ---------
l.  504  5  7  2
```

```
1 )147 at 5l. 2s. 7d. 2q
-
10     5
    ---------
     735
1     14  14  0
-
4      3  13  6
1         18  4 2
-   --------------
4    754   5 10 2
```

Theſe ſeem to me to be the moſt material Caſes, *into which this* Rule *may be Divided; and though this way of managing the* Rule *differ from any thing yet extant, yet I think the conveniencies that attend it are conſiderable enough to recommend to the Learner; one of which is this, viz. that according to this way of Dividing it, the ſame Queſtion does many times fall under two or three of theſe* Caſes, *ſo that the ſame thing may be ſeen in ſo many different lights at once, and by that means we have more ways than one for doing the ſame thing; and therefore we not only have an opportunity of chooſing the beſt, but alſo if (as many times it may happen) ſome of theſe eſcape the Memory, yet ſome or other will poſſibly occurr upon every emergence.*

Weights by PRACTICE.

QUESTIONS which commonly occur in *Practice* concerning Weights, do generally conſiſt of ſeveral *Denominations*, therefore the Opperations in ſuch Caſes as theſe muſt be performed by this.

RULE.

Firſt work for the Integeral part by ſome of the preceding *Rules* (not as yet regarding the odd Weight) when you have done ſo, take ſuch part of your given price, or ſome part already taken, as your odd Weight is of the given *Unit*, or that which the other part was taken for; this added to the value of the *Integers* gives the Anſwer. The following *Tables* being neceſſary for the reſolving Queſtions of this kind, ſhould be learned perfectly by Heart.

Tables of the Aliquot parts of a

C.		*Tun*	lb.		Q.		*of a C. wt.*
10	is	$\frac{1}{2}$	56	Or	2	is	$\frac{1}{2}$
5		$\frac{1}{4}$	28		1		$\frac{1}{4}$
4		$\frac{1}{5}$	16				$\frac{1}{7}$
$2\frac{1}{2}$		$\frac{1}{8}$	14				$\frac{1}{8}$
2		$\frac{1}{10}$	8				$\frac{1}{2}$ of $\frac{1}{7}$
$1\frac{1}{4}$		$\frac{1}{16}$	7				$\frac{1}{2}$ of $\frac{1}{5}$
1		$\frac{1}{20}$	4				$\frac{1}{4}$ of $\frac{1}{7}$

Tables of the Aliquot parts of

Half a C. wt.		
28 *lb.*	is	$\frac{1}{2}$
14		$\frac{1}{4}$
8		$\frac{1}{7}$
7		$\frac{1}{8}$
4		$\frac{1}{2}$ of $\frac{1}{7}$
2		$\frac{1}{4}$ of $\frac{1}{7}$

Quarter of a C. wt.		
14 *lb*	is	$\frac{1}{2}$
7		$\frac{1}{4}$
4		$\frac{1}{7}$
$3\frac{1}{2}$		$\frac{1}{8}$
2		$\frac{1}{2}$ of $\frac{1}{7}$

CASE I.

If the Quantity be any number of lbs. *which is an* Aliquot *part of a C. wt. and the price is ſo much* per *C. wt.*

RULE

Take ſuch part or parts of the Price of the *C. wt.* as your *lbs.* are of a *C. wt.* for the Anſwer.

EXAMPLES.

56 *lb.* of Sugar at 2 *l.* 12 *s.* 8 *d.* *per C. wt.*

56 *lb. is* 1 *half.* *l.* 1 6 4

28 *lb. of Coffee at* 21 *l.* 8 *s.* 3 *d. per C. wt.*

28 *lb. is* 1 4*th*	*l.* 5	7	0	3

21 *lb. of Pepper at* 1 *l.* 12 *s.* 8 *d per C. wt.*

14 *lb. is* 1 8*th*		4	1 $\frac{1}{}$
7 *lb. is* 1 *half*		2	0 $\frac{}{2}$
Anſwer	*lb.* 0	6	1 $\frac{1}{2}$

16 *lb. of Tea at* 52 *l.* 12 *s.* 4 *d. per C. wt.*

16 *lb. is* 1 7*th*	7	10	4

24 *lb. of Tobacco at* 5 *l.* 11 *s.* 4 *d. per C. wt.*

16 *lb. is* 1 7*th*		15	10 $\frac{3}{4}$
8 lb. is 1 half		7	11 $\frac{1}{4}$
Anſwer	*l.* 1	3	10

18 *lb. Legee Silk at* 25 *l.* 18 *s.* 7 *d. per C. wt.*

16 *lb. is* 1 7*th*	3	14	11
2 *lb. is* 1 8*th*	0	9	3^{8}
Anſwer	*l.* 4	3	4$\frac{1}{8}$

CASE 2.

If the Quantity be Quarters, with an Aliquot *part of one or two Quarters.*

RULE.

Take for the Quarters out of the Price of the *C. wt.* and for the *lbs.* take ſuch parts of that *Quotient* as the *lbs.* were of ſuch Quarter, or Quarters.

EXAMPLES.

2 *Q.* 14 *lb.* of Cheeſe at 1 *l.* 2 *s.* 6 *d. per C. wt.*

2 *Q. is* 1 *half*		11	3	
14 *lb. is* 1 4*th*		2	9	3
Anſwer	*l.* 0	14	0	3

2 *Q.* 8 *lb.* of Loaf Sugar at 4 *l.* 8 *s.* 9 *d. per C. wt.*

2 *Quarters is* 1 *half*	2	4	4	2
8 *lb. is* 1 7*th*		6	4	
Anſwer	*l.* 2	10	8	2

3 *Q.* 14 *lb.* at	1 *l.*	7 *s.*	8 *d.*	
2 } *Q.* { 1 *half*		13	10	
1 } *Q.* { 1 *half*		6	11	
14 *lb.* 1 *half*		3	5	2
Anſwer	*l.* 1	4	2	2

The laſt thus:

	l.	*s*	*d.*	
	1	7	8	
14 *lb:* 1 8*th ſub.*		3	5	2
Anſwer	*l.* 1	4	2	2

3 *Q.* 14 *lb.* wants juſt 14 *lb.* of 1 *C. wt.* and 14 *lb.* is 1 8th of *C. wt. per Table*; therefore I take 1 8th of the Price of 1 *C. wt.* and ſubtract it from the ſaid Price, and the Remainder is the Anſwer:

2 *Q.* 21 *lb.* at 3 *l.* 4 *s.* 8 *d. per C. wt.*			
2 *Q.* is 1 half	1	12	4
14 *lb.* 1 half		16	2
7 *lb.* 1 half		8	1
Anſwer	*l.* 2	16	7

1 *Q.* 11 *lb.* of Cotton Wool at 4 *l.* 1 *s.* 6 *d.*

	1 *Q.* 1 4*th*	1	0	4	2
7 *lb.* is 1 4*th* of 1 *Q.*			5	1	
4 *lb.* is 1 7*th* of 1 *Q.*			2	10	3
	l.	1	8	4	1

Becauſe 7 *lb.* and 4 *lb.* are both *Aliquot* parts of 1 *Q. viz.* 7 *lb.* is 1 4th, and 4 *lb.* is 1 7th, I take thoſe parts out of that which is for 1 *Q.* and the Sum of theſe three *Quotients* is the Anſwer.

C A S E 3.

If the Quantity be Hundreds, Quarters, and Pounds, and the price be ſo much per C. *wt.*

R U L E.

Work for the Hundred weights, as you would do in alike Caſe for any other *Integers*, and for the odd Quarters, and Pounds, as in the preceding *Caſes.*

EXAMPLES.

2*s* 6*d.is* $\frac{1}{8}$ 57 *C.* 1*q.* 14*lb.* of Sugar at 1*l.* 2*s.* 6*d.per C.*

	7	2	6	1 *Q is* 1 4*th*	5	7	2
Odd weight		8	$5\frac{1}{4}$	14 *lb. half*	2	9	3
l.	64	10	$11\frac{1}{4}$		8	5	1

This Operation explained.

Firſt, I take 1 8th part of 57 *C. wt.* for 2 *s.* 6 *d.* it being 1 8th part of a Pound; then I take 1 4th of the Price for 1 *Q.* and half of that for 14 *lb.* theſe I add together, and write their Sum under the value of 57 *C. wt.* at 2 *s.* 6 *d.* theſe two values, and the 57 I add into one ſum for the Anſwer.

Or, one may ſet the values of 1 *Q.* 14 *lb.* immediately under the 7 *l.* 2 *s.* 6 *d.* each by themſelves, and ſo Add as before, thus:

2 s. 6 d is 1 8th. 57 *C.* 1 *q.* 14 *lb. at* 1 *l.* 2*s.* 6*d. per C.*

7 2 6
5 7 2
2 9 3

Anſwer l. 64 10 11 1

63 *C.* 2 *Q.* 8 *lb.* of Treacle at 14 *s.* 2 *d.* *per C. wt.*

7
44 2
10 6
odd wt. 8 1
l. 45 0 7

2 *Q.* 1 *half*
8 *lb.* 1 *7th*

7 1
1 0
8 1

72 *C.* 3 *q.* 11 *lb.* at 2 *l.* 4 *s.* 4 *d. per C. wt.*

4 s.	$\frac{1}{5}$	72			2 Q	$\frac{1}{2}$	1	2	2	
		14	8	0	1 Q	$\frac{1}{2}$		11	1	
4 d.	$\frac{1}{12}$	1	4	0_1				2	9	1
odd wt.		1	17	$7\frac{1}{4}$	7 *lb.*	$\frac{1}{4}$		1	7	
					4 *lb.*					
l.		161	9	7		$\frac{1}{7}$	1	17	7	1

3 s. 4 d. $\frac{1}{6}$ 64 *C.* 0 Q 18 *lb.* of Tea at 13 *l.* 3 *s.* 4 *d.*

	13									
					16 *lb*	1 7th	1	17	7	1
	832				2 *lb.*	1 8th		4	8	1
	10	13	4							
Odd weight	2	2	3	2			2	2	3	2
l.	844	15	7	2						

This Operation explained.

First, I multiply 64 *C. wt.* by 13 *l.* which product is the Price of the *C. wts.* at 13 *l. per C. weight*, then I take 1 6th of the *C. weights* for 3 *s.* 4 *d.* for 16 *lb.* I take 1 7th of the Price of one Hundred weight, and 1 8th of that for 2 *lb.* the Sum of all theſe particulars is the Anſwer.

10 s. $\frac{1}{2}$ 57 *C.* 0 *q.* 4 *lb.* of Pepper at 14 *l.* 17 *s.* 6 *d.*

	14			
	798			
5 s. $\frac{1}{2}$	28	10	0	
2s. 6d $\frac{1}{2}$	14	5	0	
$\frac{1}{2}$	7	2	6	
odd wt		10	7	2
	l. 848	8	1	2

1 Q. 1 4th				
4 lb. 1 7th	3	14	4	2
		10	7	2

Shorter thus:

2 s. 6 d. 1 8th	57			
	15			
	855			
Subtract	7	2	6	
	847	17	6	
		10	7	2
	l. 848	8	1	2

Here I Multiply 57 *C.* weight by 15 *l.* and becauſe that is 2 s. 6 d. too much, I take 1 8th of 57, and Subtract; to the remainder I add the value of the odd weight for the Anſwer.

```
1 s. 8 d. 1 12th) 97 C. 1 Q. 15 lb. at 21 l. 9 s. 8 d.
                  21                1 Q. 1/4  ----------
                 ----               7 lb. 1/4  5   7  5
                 2037                          1   6 10 1
                   38  16           1 lb. 1/7  1   6 10 1
                    8   1  8                       3 10
Odd weight          8   4 11  2                ----------
                 -------------                 8   4 11 2
              l: 2092   2  7  2                ----------
              ----------------
```

Firſt, I multiply the 97 C. wt. by 21 l. then I multiply the ſame by 4 for 8 *s.* as was directed in *Caſe* 8; then I take 1 12th thereof for 1 s. 8 d. and for the odd weight I take 1 4th of the Price of 1 C. wt. for 1 Q. and 1 4th of that *Quotient* for 7 lb. which I ſet down twice, and 1 7th of the laſt *Quotient* for 1 *lb.* then I add all theſe particulars together for the Anſwer.

```
        16 Tun 12 C. 1 Q. 7 lb. at 5 l. 4 s. 3 d. per C.
           20                       ---------------
          ----          1 Q. 1 4th  1   6  0  3
4 s 1/5   332 C. wt.    7 lb. 1 4th     6  6
            5                       ---------------
          ----                      1  12  6  3
         1660                       ---------------
           66  8  0
            4  3  0
            1 12  6  3
         -------------
      l. 1732  3  6  3
      ----------------
```

Firſt, I multiply the Tuns by 20, to reduce them into C. wts. which I multiply by 5 l. then I take 1 5th for 4 s. and 1 80th for 3 d. both out of the C. wt. the reſt as in other *Examples*.

CASE 4.

If the weight of the commodity be given in C. Q. lb, and the price be ſo much per lb.

RULE.

Reduce the Weight into Pounds, and then work by the preceding *Rules*, according to the Price.

EXAMPLES.

```
     23 C. 1 Q. 18lb. at 7 d. 2 q. per lb.
     23                  42 C. 3 q. 12 lb. at 9d. 3q.
    23                   42
   2356                 42
 ______________         4296
4)2622lb. 7 d. 2 q      _____
 ______________        8,0)480,0 lb. at 9 d. 3q. per lb.
8)655   10              _____
 __________            4)60  0
 81   18   9              3
 __________            _____
                         180
                          15
                       ______________
                       l. 195  0  0
                       ==============
```

61 C. 1 Q. 27 lb. of Tobacco at 14 d. 1 q. (per lb.
61
61
6155

12,0)688,7 lb. at 14 d. 1 q.

$\frac{1}{8}$)57 7 10
3

401 14 10
7 3 5 3

l. 408 18 3 3

PRACTICE *by the* Aliquot *parts of Two Shillings.*

SECTION 12.

ALL that needs to be ſaid upon this method of working *Practice* by way of Preliminary, may be met with at the beginning of this *Chapter*; I ſhall therefore exhibit a *Table* of the *Aliquot* parts of two Shillings, and ſo proceed.

Aliquot

Aliquot parts of Two Shillings.

For *d.*		Take *th.*	of *th.*
1	4*th*	1 8	1 12
1	*half*	1 8	1 6
3	4*th*	1 4	1 8
1		1 12	1 12
1	1 *half*	1 4	1 4
2		1 12	
3		1 8	
4		1 6	
6		1 4	
8		1 3	
12		1 2	

N. B. This Table muſt be learned perfectly by Heart before you begin to work.

2. I ſhall take the *Caſes* in the ſame order, and uſe the ſame *Examples* (as much as I can) which I did in the other way. I might alſo let the ſame *Rules* ſerve, with the alteration of a few words; but fearing that may create ſome difficulty to the Learner, I rather chooſe to be guilty of Tautology than Obſcurity; and ſhall therefore give the *Rule* proper for each *Caſe*, and in words proper for the method.

CASE 1.

If the Price be any Aliquot part of two Shilling.

RULE.

Divide the *Integers* brought into *Integers* of 2s. by the *Denominator* of ſuch *Aliquot* part, as in *Diviſion of divers Denominations*, and the *Quotient* will be the Anſwer.

EXAMPLES.

7693 at 1 q.	2429 at 3 q.
$\frac{1}{12}$)769 6 *Integ. of* 2s.	$\frac{1}{8}$)242 18 0
$\frac{1}{8}$)64 2 2	$\frac{1}{4}$)30 7 3
l. 8 0 3 1	l. 7 11 9 3

Firſt, I ſet down the *Integers* over again, doubling the *Units* Figure for Shillings, that I Divide by the *Denominators* of the parts in the *Table*, and the laſt *Quotient* is the Anſwer.

869 at 2 d.
$\frac{1}{12}$)86 18 0
l. 7 4 10

735 at 4 d.
$\frac{1}{6}$)73 10 0
l. 12 5 0

847 at 3 d.
$\frac{1}{8}$)84 14 0
l. 10 11 9

683 at 6 d.
$\frac{1}{4}$)68 6 0
l. 17 1 6

N. B. If you have *Integers* and parts of an *Integer* in this or any other Caſe, take ſuch a part of two Shillings as your part is of an *Unit*, and add that to the *Integers* brought into two Shillings, and then proceed as if there were no ſuch parts.

EXAMPLES.

379 3 q. at 8 d.
$\frac{1}{3}$)37 19 6
l. 12 13 2

In this *Example* becauſe there is 3 4th of an *Unit* I take 3 4th parts of 2 s. *i. e.* 1 s. 6 *d*. and add it to the *Units* Figure double, and it makes it 19 *s*. 6 *d*. and then I take 1 3d for the Anſwer.

427 $\frac{3}{8}$ ths at 12 *d*.
$\frac{1}{2}$)42 14 9
l. 21 7 4 2

In this I take 3 8ths of 2 s. *i. e.* 9 *d*. and add it to the *Units* Figure double, and ſo proceed to Divide by 12. for the Anſwer.

CASE 2.

If the price be a Multiple *of ſome* Aliquot *part of* 2 s.

RULE.

Multiply the *Integers* reduced into *Integers* of 2 s. by the *Numerator* of ſuch *Multiple*, and Divide the Product by the *Denominator*, and the *Quotient* will be the Anſwer.

Or, Divide the ſaid *Integers* by the *Denominator*, and multiply the *Quotient* by the Numerator, and the Product will be the Anſwer.

Here followeth a TABLE *of the* Multiples *of the* Aliquot *parts of two Shillings.*

	s.	d.		*Parts*
For	0	$1\frac{1}{4}$	Take	$\frac{5}{96}$
		$2\frac{1}{2}$		$\frac{5}{48}$
		$3\frac{1}{2}$		$\frac{7}{48}$
		$4\frac{1}{2}$		$\frac{9}{48}$
		$5\frac{1}{2}$		$\frac{11}{48}$
		$7\frac{1}{2}$		$\frac{5}{16}$
		$10\frac{1}{2}$		$\frac{7}{16}$
		9		$\frac{3}{8}$
	1	$1\frac{1}{2}$		$\frac{9}{16}$
	1	3		$\frac{5}{8}$
	1	4		$\frac{2}{3}$
	1	8		$\frac{5}{6}$
	1	9		$\frac{7}{8}$

EXAMPLES.

737*lb* at 1*s.* 4*d. per lb*

73 14 *Inte. red. to* 2s

5

$\frac{1}{12}$)368 10

$\frac{1}{8}$ 30 14 2

l. 3 16 9 1

823 at 3 d. 2q.

82 6. 0

7

$\frac{1}{8}$)576 2 0

$\frac{1}{6}$)72 0 3

l. 12 0 0 2

The laſt Example, thus:

$\frac{1}{8}$)82 6
10 5 9 *ſubtract*

6)72 0 3

l. 12 0 0 2

746 2 3ds at 13 d. 2 q.

74 13 4
9

$\frac{1}{8}$)672 0 0

$\frac{1}{2}$ 84 0 0

. 42 0 0

Or thus,

$\frac{1}{8}$)74 *l.* 13 *s.* 4 *d.*
9 6 8

$\frac{1}{2}$)84 0 0

l. 42 0 0

769 at 10 d. 2 q.

76 18
7

8)538 6

$\frac{1}{2}$)67 5 9

l. 33 12 10 2

625 at 20 d.

62 10
5

$\frac{1}{6}$)312 10

52 1 8

Or thus,

$\frac{1}{6}$)62 10
10 8 4

l. 52 1 8

CASE 10.

If the price be either the ſum or difference of ſome Aliquot *part of two Shillings, and an* Aliquot *part of that part.*

RULE.

Divide the *Integers* reduced *Integers* of 2 *s.* by the *Denominator* of the *Aliquot* part of two ſhillings, and that *Quotient* by the *Denominator* of the other part; and the Sum or Difference of theſe two *Quotients* is the Anſwer.

EXAMPLES.

833 at 5 d.

$\frac{1}{6}$	83	6	0	
	13	17	8	
$\frac{1}{4}$	3	9	5	*Add*
l.	17	7	1	

Or thus,

$\frac{1}{4}$	)83	6		
$\frac{1}{6}$	)20	16	6	
	3	9	5	*ſubtract*
l.	17	7	1	

724 at 7 d.

$\frac{1}{3}$	)72	8	0	
$\frac{1}{8}$	)24	2	8	
	3	0	4	*ſubtract*
l.	21	2	4	

Or thus,

$\frac{1}{4}$	)72	8		
$\frac{1}{6}$	)18	2		
	3	0	4	*Add*
l.	21	2	4	

737 $\frac{5}{8}$ths at 13 *d*

$\frac{1}{2}$)73 15 3

$\frac{1}{12}$)36 17 7 2

Add 3 1 5 $\frac{1}{2}$ $\frac{1}{2}$

l. 39 19 1 $\frac{1}{2}$ $\frac{1}{2}$

489 $\frac{7}{12}$th at 18*d*

$\frac{1}{2}$)48 19 2

$\frac{1}{2}$)24 9 7 *Add*

l.12 4 9 2

l. 36 14 4 2

C A S E 4.

If the Price be the Sum or Difference of an Aliquot *part of 2 Shilling, and an* Aliquot *part of ſome other* Aliquot *part.*

R U L E.

Take for the two *Aliquot* parts of 2 s. and of the *Quotient* belonging to the part of which the third part is a part, take ſuch a part as the *Denominator* of the third part denotes; then the Sum or difference of that Quotient, and the Quotient belonging to that part whereof the third part is not a part is the Anſwer.

E X A M P L E S.

676 at 8 d. 1 q.

$\frac{1}{3}$)67 12 0

$\frac{1}{12}$)22 10 8

$\frac{1}{8}$) 5 12 8

14 1 *Add*

l. 23 4 9

676 at 7d. 3 q.

$\frac{1}{3}$)67 12 0

$\frac{1}{12}$)22 10 8

$\frac{1}{8}$)5 12 8

14 1 ſub.

l. 21 16 7

CASE 5

If the price be either the ſum or difference of two Aliquot *parts of two Shillings.*

RULE.

Divide the *Integers* reduced into *Integers* of 2 s. by the *Denominators* of thoſe parts ſeverally ; and the Sum, or Difference of thoſe *Quotients* is the Anſwer.

EXAMPLES

	637 at 5 d.		
1/8	63	14	0
1/12	7	19	3
	5	6	2 *Add*
l.	13	5	5

	713 at 11 d.		
1/3	)71	6	0
1/8	)23	15	8
	8	18	3 *Add*
l.	32	13	11

CASE 6.

If the price be any even number of Shillings.

RULE.

Multiply the *Integers* reduced into *Integers* of 2 s. by 1 half the even number of Shilling, and the Product will be the Anſwer.

EXAMPLES.

721 at 4 s.

72 2
2

l. 144 4

163 *lb.* 3 *oz. Troy* at 8s.

16 6 6
4

l. 65 6 0

27 lb. 5 oz. 8 dr. at 16s

2 14 8 1
8

l. 21 17 6

469 at 6 s.

46 18
3

l. 140 14

161 3 Q. at 12 .

16 3 6
6

l. 97 1 0

39 *E*. 3 *Q*. 3 *N*. at 18s.

3 19 6
9

l. 35 15 6

Caſe

CASE 7

If the price be the ſum or difference of the Multiple *of ſome* Aliquot *part of 2 s. and an* Aliquot *part of that part.*

RULE.

Work for the *Multiple* as was directed in *Caſe* 2. and take ſuch a part of the firſt part, as the *Denominator* of the ſecond part denotes; the Sum or Difference of thoſe two Sums is the Anſwer.

EXAMPLES.

1271 at 9 d. 1 q.				
$\frac{1}{8}$	127	2	0	
$\frac{1}{12}$	15	17	9	
			3	
	47	13	3	
	1	6	5	3
l.	48	19	8	3

1167 at 15 d. 2 q.				
$\frac{1}{8}$	116	14	0	
$\frac{1}{6}$	14	11	9	
			5	
	72	18	9	
Add	2	8	7	2
l.	75	7	4	2

In the firſt *Example* I take 1 8th for 3 *d.* and multiply the *Quotient* by 3 for 9 *d.* and 1 12th part of 3 d. for the Farthing, and their Sums is the Anſwer.

1271 at 8 *d.* 3 *q.*

$\frac{1}{8}$)	127	2	0		
$\frac{1}{12}$)	15	17	9		
			3		
	47	13	3		
	1	6	5	3	*ſubt*
l.	46	6	9	3	

1167 at 14 *d.* 2 *q.*

$\frac{1}{8}$)	116	14	0	
$\frac{1}{6}$)	14	11	9	
			5	
	72	18	9	
Subt.	2	8	7	2
l.	70	10	1	2

CASE 8.

If the Price be an odd number of Shillings.

RULE.

Multiply the *Integers* reduced into *Integers* of 2*s.* by half the next leſs even number, adding half the *Integers* into the Product as you multiply.

EXAMPLES.

246 at 7 s.

	24	12
		3
l	86	2

Here I multiply 24 l. 12 s. by 3, thus, 3 times 12 is 36, and 6 the half of 12 is 42 s. or 2 l. 2 s. ſet down 2 s. and carry 2 l. then 3 times 24, and 2 I carry, and 12 the half of 24 is 86 l. which I ſet down.

```
268  at  17 s.
-------------
26   16
      8
-------------
l. 227   16
-------------
```

Here I multiply 26 l. 16s. by 8, thus, 8 times 16 is 128, and half of 16, *i.e.* 8, makes 136 s. or 6 l. 16 s. ſet down 16 s. then 8 times 6 is 48, and 6 I carry is 54, and half of 6, *i. e.* 3 is 57, ſet down 7, then 8 times 2 is 16, and 5 and 1 is 22, to ſet down.

N. B. If when the *Integers* are reduced into *Integers* of 2 s. the *Units* Figure of the Pounds be an odd number, and all the others even, you muſt add 10 extraordinary to the Product when you multiply the Shillings by half the next leſſer even number; and when you multiply the *Units* Figure of the Pounds, add half the neareſt leſſer even number to the ſaid *Units* Figure, and for the reſt as before.

EXAMPLES.

```
697  at  9 s.
-------------
69   14
      4
-------------
l. 313   13
-------------
```

The *Integers* reduced to *Integers* of 2 s. is 69 l. 14 s. and half the neareſt even number to 9 s. is 4, therefore I multiply by 4, thus, 4 times 14 is 56, and 7 the half of 14 makes 63, and 10 makes 73, or 3 *l.* 13 *s.* I ſet down 13 s. and carry 3 l. then 4 times 9 is 36, and 3 I carry is 39, and 4 the half of the neareſt leſſer even number to 9 is 43, ſet down three and carry 4, then 4 times 6 is 24, and 4 is 28, and 3 the half of 6 is 31, which I ſet down, and 'tis done.

274 at 15 s.

27 8
7

l. 205 10

479 at 11 s.

47 18
5

l. 263 9

Here I multiply 47 l. 18 s. by 5, thus, 5 times 18 is 90, and 1 half of 18, *viz.* 9 is 99, and 10 is 109 s. or 5 l. 9 s. ſet down 9 s. and carry 5 l. then 5 times 7 is 35, and 5 I carry is 40, and Three is 43, I ſet down 3 and carry 4, then 5 times 4 is 20, and 4 I carry is 24, and 2 the half of 4 is 26, which I ſet down, and 'tis done.

236 at 19 s.

23 12
9

l. 224 4

2. If the Figure towards the left hand of the *Units* Figure, or any other be odd, that then one muſt be taken from the ſaid odd Figure, and for it 10 muſt be put to the Figure that ſtands at the right hand of that odd Figure, which number muſt be halved, & that half taken in when you multiply, remembering to ſet down an odd half for Shillings, when the Units Figure is odd. But if the Figure towards the left hand of any other be even, then only take in half the Figure that was multiplied; thus continue multiplying, & taking in half the Figure multiplied, being increaſed by 10 as occaſion requires, till the operation is finiſh'd.

EXAMPLES:

3737 at 13 s.

373 14
       6

l. 29 1

4752 at 17 s.

475 4
       8

l. 4039 4

CASE 9.

If the price be Pounds with an even number of Shillings.

RULE.

Set down the Pounds, and half the number of Shillings under the given *Integers* for a Multiplier, by which multiply the *Integers*, doubling the firſt Figure of the Product for Shillings, and the reſt are Pounds.

EXAMPLES.

124 *C. wt.* at 1 *l.* 6 *s. C.*
13

l. 161 4

143 C. wt. 2 l. 12 s. p.C.
26

l. 371 16

249 C. at 5 l. 8 s. C
54

99 12
1245

l. 1344 12

167 C. at 11 l. 14 s.
117

l. 1953 18

CASE 10.

If the Price be Pounds, Shillings, Pence, and Farthings.

RULE.

Multiply the Price by the *Integers*, by ſuch variety in *Compendiums* as ſuits the occaſion.

EXAMPLES.

12 Pieces at 2 l. 5 s. 9d.
12
l. 27 9 0

9 *C.* at 4 l. 12 s. 7 d. 2 q.
9
l. 41 13 7 2

27 Bags at 8l. 1s. 9d.
9
72 15 9
3
l. 218 7 3

42 Doz. at 14l. 8s. 3d.
7
100 17 9
6
l. 605 6 6

124 at 21 l. 5 s. 2 d.
4
85 0 8
2551 0 0
l. 2636 0 8

369 at 42 l. 11 s. 3d.
9
383 1 3
15322 10 0
l. 15705 11 3

7392 Tuns at 7 l. 6 s. 4 d. 2 q. per Tun.

```
                          7392
                         ------
   4)200                14   12   9
 ---------              658  13   9 ⎧   4)20
 12)150                2195  12   6 ⎨  ------
 ---------            51231   5   0 ⎩ 12)45
 2,0)191,2   6        -------------   ------
 -------------        l.54100  4  0 ⎧ 3,0)17,3  9
   95   12            -------------  ⎨ ----------
 ----------                         ⎩    8   13

   4)2000
 ---------
 12)7500
 ---------
 2,0)462,5
 ---------
   231   5
```

Theſe things have been ſo largely inſiſted on, under their proper Varieties, that is needleſs to enlarge upon them here.

SECTION 13.

Another method for working by the Aliquot parts of Two Shillings.

I SHALL not much inſiſt upon this method, not ſo much becauſe I do not think it deſerveth to be inſiſted on, as becauſe I know, that if what hath been already ſaid be well underſtood, it cannot need it. I ſhall therefore give ſome general *Rules* and *Examples*, and for particulars refer to the *Rules* and *Examples* already given.

CASE 1:

If you are to work for an Aliquot *part of* 2 *ſhillings*

RULE.

Take ſuch a Part of the *Integers*, as the part you work for is of 2 Shillings, and the remainder is ſo many of thoſe parts; which muſt be ſet down in the place of Shillings and Pence: And the *Units* Figure of the *Quotient* muſt be doubled, and added to the Shillings, which ſtands in the Shillings place, and you will have the Anſwer.

EXAMPLES.

12)869 lb. at 2 d

7,2 0 10

7 4 10

In this *Example.* I divide by 12, and the *Quotient* is 72, and 5 remains, which is 5 two pences, *i. e.* I cut off the 2 in the *Units* place of the *Quotient*, and double it for Shillings, and the Anſwer is 7 *l.* 4 *s.* 10 *d.*

8)847 at 3 *d.*

10,5 1 9

10 11 9

Here I Divide by 8, the 3 pences in 2 *s.* and the *Quotient* is 105, & 7 three-pences remains which is 1 *s.* 9 *d.* theſe I ſet down in the places of Shillings and Pence; then I double the 5 in the *Units* place of the *Quotient*, and add that to the 1 *s.* and the *Anſwer* is 10 *l.* 11 *s.* 9 *d.*

4)469 at 6 d.

117 0 6

l. 11 14 6

2)427 at 12 *d.*

21,3 1 0

l. 21 7 0

Caſe

CASE 2.

If you are to take an Aliquot *of ſome other* Aliquot *part.*

RULE.

The firſt part being taken by the laſt *Caſe*, Divide that *Quotient* by the *Denominator* of the other part, obſerving to double what remains in the *Units* place of the *Integral* part of the ſaid *Quotient*; to that add the Shillings in the Shillings place, if there be any, and Divide thoſe Shillings and the Pence as uſual for the Anſwer.

EXAMPLES.

12)7693 at 1 *q.*				
8)641	0	2		
8,0	0	3	1	
l. 8	0	3	1	

In this *Example* I divide by 12, as directed in the laſt *Caſe*, then I divide that *Quotient* by 8, thus: 8 in 64 is 8 times, and (0) remains, then 8 in 1 is no time, but 1 remains which double is 2 Shillings, whoſe 8th part is 3 d. and the 8th of 2 d: is 1 q. ſo the Anſwer is 8 l. 0 s. 3 d. 1 q.

8)2429 at 3 q.				
4)303	1	3		
75	1	9	3	
l. 7	11	9	3	

Having firſt divided by 8, I divide the *Quotient* by 4, thus, 4 in 30 is 7 times and two remains, then 4 in 23 is 5 times, and 3 remains, which double is 6 s. and 1 in the Shillings place is 7 s. and the 4th part of 7 s. 3 d. is 1 s. 9 d. 3 q. and the Anſwer is 7 l. 11 s. 9 d. 3 q.

6)637 at 5 d.			
4)106	0	4	
26	1	1	
13,2	1	5	Sum
l. 13	5	5	

Here I take 1 6th for 4 d. and 1 4th thereof for 1 d. which I add together for the Anſwer

4)429 at 7 *d.*			
6)107	0	6	
17	1	9	
125	0	3	Sum
l. 12	10	3	

Here I take 1 4th of the *Integers* for 6 d. and 1 6th thereof for 7d. and add theſe 2 *Quotients* together for the Anſwer.

N. B. If you have odd parts of an *Integer*, take ſuch a part of two Shillings as thoſe parts are of an *Integer*, and ſet it down in the place of Shillings and Pence; and then proceed as hath been directed.

EXAMPLES.

746 $\frac{1}{3}$ at 13 $\frac{1}{2}$		
2)746	1	4
8)373	0	8
46	1	4
42,0	0	0
l. 42	0	0

489 $\frac{7}{12}$ at 18 *d.*			
4)489	1	2	
122	0	9	2
		3	
36,7	0	4	2
l. 36	14	4	2

Note alſo, That according to this method, whether you add or multiply, for every 2 in the Shillings you carry 1; alſo, if you Subtract you borrow 2 in the Shillings.

CASE 3.

If the Price be two Shillings, with Pence, and Farthings.

RULE.

Work for the odd Pence and Farthings, as at other times, and add thoſe *Quotients* and the *Integers* into one Sum for the Anſwer.

EXAMPLES.

8)271 at 2 *s.* 3 *d.*

33 1 9

30,4 1 9

l. 30 9 9

6)249 at 2 *s.* 4 *d.* 2 *q.*

8)41 1 0

5 0 4

29,5 1 4 2

l. 29 11 4 2

CASE

CASE 4.

If you are to work for any Aliquot part of a Pound above two Shillings.

RULE.

Add a Cypher to the right hand of the *Integers*, and then Divide by the *Denominator* of the part, as at other times, and the Remainder will be ſo many ſuch parts of two Shillings, as the *Denominator* of the part is of a Pound; which muſt be ſet down for Shillings and Pence.

EXAMPLES.

185 at 2 s. 6 d.
8)1850

23,1 0 6

l. 23 2 6

Here I add a Cypher to the *Integers*, and divide by 8, becauſe 2 *s.* 6 *d.* is 1 8th part of a Pound, and the *Quotient* is 231, and 2 remains, which is two three-pences, or 6 *d.*

169 *at* 3 *s.* 4 *d.*
6)1690

28,1 1 4

l. 28 3 4

Having added a Cypher to the *Integers*, I divide by 6, and the *Quotient* is 28, and 4 remains, which is four Groats, ſo the Anſwer is 28 *l.* 3 *s.* 4 *d.*

149 at 6 *s.* 8 *d.*
3)1490
49,6 1 4
l. 49 · 13 4

161 at 13 *s* 4 *d.*
3)1610
536 1 4
2
107,3 0 8
l. 107 6 8

N. B. If there be any odd parts of an Integer in this *Caſe*, imagine a Cypher added to the right hand of the *Numerator* of ſuch parts, and divide by the *Denominator*, and ſet the *Quotient* on the right hand of the *Integers* inſtead of a Cypher, and if any thing remain in that *Diviſion*, it is ſo many ſuch parts of two Shillings, as the *Denominator* denotes.

EXAMPLES.

197 $\frac{3}{4}$th at 6 *s.* 8 *d*
3)1977 1 0
65,9 0 4
l. 65 18 4

Here I imagine a Cypher added at the right hand of the *Numerator* of the *Fractional* part, and it makes 30, which I Divide by the *Denominator* 4, and the *Quotient* is 7, which I ſet on the right hand of the *Integers* inſtead of a Cypher, and there remains 2 4th parts of 2 s. or 1 s. which I ſet in the Shillings place, and Divide by 3 as uſual, and the Anſwer is 65 l. 18 s. 4 d.

215 $\frac{1}{5}$th at 4 s.
5)2152
430 0 9 2
l. 43 0 9 2

Here I add a Cypher to the *Numerator* 1, and divide by the *Denominator* 5, and it Quotes 2, which I place on the right hand the *Integers*, and then take 1 5th for 4 s. and the Anſwer is 43 *l.* 0 *s.* 9 *d.* 2 *q. ſere.*

143 $\frac{3}{8}$ *ths at* 5 *s.*
4)1433 1 6
35,8 0 10 2
l. 35 16 10 2

129 $\frac{7}{12}$ *th at* 15 *s.*
4)1295 1 8
323 1 11
3
97,1 1 9
l. 97 3 9.

And thus much for *Practice*, wherein I have been very large and very plain, being very well aſſured that he that underſtandeth the *Golden Rule* and *Practice* well, will merit the name of a good Accomptant.

SECTION 14.

Tare and *Trett.*

DEFINITION 1.

TARE is an Allowance in Merchandiſe, made by the Seller to the Buyer for the weight of the Bag, Box, Cheſt, or whatever contains the Commodity; after this Allowance is made and deducted from the *Groſs weight*, (which is the weight of the Commodity and Bag, Box, *&c.* together) the remainder is the weight of the Commodity only; and if there is no Allowance for *Trett*, it is called *Nett Weight*, and this Allowance is various in various Commodities.

2. *Trett* is an Allowance made for the Waſte, or Duſt that may be mixed with the Commodity, and is always 4 *lb.* in 104 *lb.* But though the Merchant alloweth this to the Retailer, yet he himſelf is only allowed *Tare* in paying Cuſtom; that is, he pays as well for the worſt as for the beſt of the Commodity.

3. In ſuch Commodities wherein *Trett* is allowed, the remainder after *Tare* is taken out, is called *Suttle*; out of which *Suttle*, the allowance for *Trett* is taken, and then the remainder is called *Nett weight*. But if no allowance is made

for *Trett*, the remainder when *Tare* is deducted out of the *Groſs* is called *Nett weight*, as was ſaid before. For the better remembring theſe things, take theſe memorable Verſes, *viz.*

From Groſs *ſubtract the* Tare,
Remainder Suttle *are*;
From Suttle *take the* Trett,
And the Remainder's Nett.

For more convenient handling this *Rule*, we have Divided it into Four *Varieties*, as followeth.

VARIETY I.

When the allowance for Tare *is ſo much* per *Score*, i. e. *when there is ſo much* Tare *allowed for every* 20 *lb.* Groſs.

RULE.

If the *Ratio* of the *Tare* to the *Groſs weight*, be expreſſed by a *Vulgar Fraction*, and the *Numerator* thereof be an *Unit*; Divide the *Groſs weight* by the *Denominator* of the ſaid *Fraction*, and the *Quotient* is the *Tare*, which taken from the *Groſs weight* leaves the *Nett weight*.

EXAMPLE I.

C. *Q.* *lb.*

Gr. wt. 31 1 4 *Tare,* $\frac{2}{1}$ *lb.* p. *ſcore,* *Quere N. wt.*

31
31
3132

4,0)350,4

Tare 87 $\frac{24}{40}$ *lbs.*

Nt. 4)3416 $\frac{16}{40}$

7)854

4)122

Nett 30 2 0 $\frac{16}{40}$

Or thus, 4)31 *C.* 1 *Q.* 4 *lb.* $\frac{24}{40}$

10) 7 3 8 } 0 { $\frac{16}{40}$

Tare 0 3 3 } 6 { $\frac{16}{40}$

Nett 30 2 0

Here the *Fraction* which expreſſeth the *Ratio* of the *Tare* to the *Groſs* is 1 40th, for 40 half lb. is 20 lb. therefore I Divide by 40 and the *Quotient* is the *Tare*, which I take from the *Groſs* the remainder is the *Nett weight*.

EXAMPLE 2.

C. Q: lb.

Gr.wt. 43 2 8 *Tare* $\frac{1}{4}$ *lb.* per Score, *Quere N. wt.*

43

43

4364

8,0)488,0

Tare 61

7)4819

4) 688 3

4) 172 0 } 3

Nett 43 0 3

Or thus,

C. Q. lb.

8)43 2 8

10) 5 1 22

Tare 0 2 5

Nett 43 0 3

In this *Example* the *Fraction* which expreſſeth th *Ratio* of the *Tare* to the *Groſs* is 1 80th, for 80 *Qrs.* of a *lb.* is 20 *lb.* ſo I Divide by 80 for the *Tare*, which I ſubtract from the *Groſs*; the remainder i *Nett weight.*

RULE 2.

If the Numerator *of the* Ratio *be more than an* Unit.

Multiply the *Groſs weight* by the *Numerator* of the *Fraction*, and Divide the Product by the *Denominator*, and the *Quotient* will be the *Tare*, which taken from the *Groſs* leaves *Nett weight.*

Or, Divide the *Groſs* by the *Denominator*, and Multiply the *Quotient* by the *Numerator*, and the Product will be the *Tare*, which taken from the *Groſs* leaves *Nett weight.*

EXAMPLE 1.

C. Q. lb.
Gr. wt. 52 3 12 *Tare* $\frac{3}{4}$ *lb*, p. Score. *Quere N. wt.*
52
52
5296
Groſs 5920 *lb*
3
8,0)1776,0
Tare 222
7)5698
4)814 0 } 14
4)203 2
Nett 50 3 14

Or thus,
C. Q. lb.
52 3 12
3
8)158 2 8
10) 19 3 8
Tare 1 3 26
Nett 50 3 14

This needs no Explanation.

EXAMPLE 2.

C. *Q.* *lb.*
Gr. wt. 37 1 24 *Tare* 1 $\frac{3}{4}$ per Score, *Quere Nt. wt.*

37
37
3752
4196
7
80)29372
Tare 367 $\frac{12}{80}$
Nt 7)3828 $\frac{68}{80}$
4)546 6 } 20
4)136 2
Nett 34 0 20 $\frac{68}{80}$

Or thus,
C. *Q.* *lb.*
37 1 24
7
8)262 1 6
10) 32 3 3
3 1 3
Nett 34 0 21

The Reaſon of a ſmall Difference between theſe two ways, is a ſmall *Remainder* in this Operation which I have not taken Notice of.

This may be perform'd without multiplying by 7, *i. e.* by Dividing by 8, and ſubtracting the *Quotient* from the *Groſs* weight, and then dividing the Remainder by 10, and that *Quotient* will be the *Tar*

Thus:

	C.	Q.	lb.
8)	37	1	24
	4	2	20
10)	32	3	04
Tare	3	1	3
Nett	34	0	21

Here the *Fraction* which expreſſeth the *Ratio* of the *Tare* to the *Groſs* weight is 7 80th; for 1 *lb.* and 3 4ths of a *lb.* is 7 *Qrs.* and 80 Qrs. is 20 *lb.* and therefore, &c.

VARIETY 2.

When the Tare *is ſo much per* Bag, Box, Cheſt, &c. *and it is required to find the* Nett *weight.*

RULE.

Multiply the Number of Bag, Box, &c. *by the* Tare *allowed for one* Bag, Box, &c. *bring that Product into* Hundreds, Quarters, *and* Pounds, *and ſubtract them from the* Groſs, *and the Remainder is the* Nett *weight.*

EXAMPLE 1.

If the *Groſs weight* of 16 Bags of Cotton Yarn be 42 *C.* 1 *Q.* 12 *lb.* and *Tare* 12 *lb. per* Bag, what is the *Nett* weight?

16 Bags
12

7)192

4)27 3

4)6 3 } 24

1 2 24

	C.	Q.	lb.
Groſs wt.	42	1	12
Tare	1	2	24
Nett weight	40	2	16

Example

EXAMPLE 2.

What is the *Nett* weight of 25 Cheſts, *Groſs* being 52 *C.* 2 *qrs.* 18 *lb.* and *Tare* 9 *lb.* 1 half *per* Cheſt?

	C.	*Q.*	*lb.*
Groſs	52	2	18
Tare	2	0	13
Nett	50	2	4

25 Cheſts
9
225
12 $\frac{1}{2}$
7)237 $\frac{1}{2}$
4)33 6 } *lb.*
4)8 1 } 13
2 0 13 $\frac{1}{2}$

Having multiplied the 25 Cheſts by 9, I take half of 25, which is 12 and a half for the half *lb.* and add it to the other Product, and the Sum is the whole *Tare*.

EXAMPLE 3.

What is the *Nett* Weight of 8 Frails of Raiſins, each weighing *Groſs* 3 *C.* 2 *qrs.* 12 *lb.* *Tare* 20 *lb.* *per* Frail?

	3 *C.*	2 *Q.*	12 *lb.*	20 *lb.* *per* Frail.
			8	8
Total Groſs	28	3	12	160 *or* 1 *C.* 1*q.* 20*lb.*
Tare	1	1	20	
Nett wt.	27	1	20	

EXAMPLE 4:

What is the *Nett* weight of 5 Bags of Cotton Wooll, Number *Groſs* weight and *Tare* as underneath.

No. 1	428	*Tare*	12
3	519$\frac{1}{2}$		14
7	316^{1}		16
8	462$\frac{4}{3}$		15—
12	516$\overline{4}$		16^{4}
Total *Groſs*	2242 1 *half*	*Tare*	74$\frac{1}{4}$
Total *Tare*	74 1 4*th*		
Nett wt.	2168 1 4*th*		

VARIETY 3.

The *Tare* being ſo much *per C. weight*, the *Groſs* given in *Hundreds*, *Quarters*, and *Pounds*, and the *Nett* required in Pounds.

RULE 1.

Subtract the *Tare* of one *C. wt*. from 112 *lb.* and the remainder will be the *Nett weight* of one *C. weight*, which multiply by the *C. wts. Groſs*, gives the *Nett weight* of all the *C. weights*, and if there be any odd *Quarters*, and *Pounds*, take ſuch parts of the *Nett* of a *C. weight* as thoſe *Quarters* and Pounds are of a *C. weight*; which added to the *Nett* of the *C. weights*, gives the total *Nett*, if there is no allowance for *Tret*, otherwiſe it is the *Suttle*.

RULE 2.

Multiply the *C. wts.* by the *Tare* allowed for 1 *C. weight*, and for any odd *Quarters* and *Pounds* take part of the *Tare* of 1 *C. wt.* (the *Groſs* being firſt reduced into *Pounds*) and from the Pounds *Groſs* ſubtract the Pounds *Tare*, and the remainder is Pounds *Nett*.

Example

EXAMPLE I.

Gr. wt. 57 *C.* 1 *Q.* 14 *lb. Tare* 8 *lb. per C. wt. how many lb. Nett.*

112
8

for 1 *Q.* take 1 4th 104 *Nett of* 1 *C. wt.*
57

728
520

5928
for 14 *lb.* take half 26
13

} *Nett* of { 57 *C. wt.* 1 *Q.* 14 *lb.*

Total Nett 5967 *lb.*

Firſt, I ſubtract 8 out of 112, the remainder is the *Nett* of 1 *C. wt.* which I multiply by 57 *C. wt.* and the Product is the *Nett* of 57 *C. weight,* in *lbs.* then I take 1 4th part of the *Nett weight* of 1 *C. weight* for 1 *Quarter*, and half of that for the *Nett* of 14 *lb,* and the number of theſe three is the Total *Nett.*

Or

Or thus by the ſecond RULE.

57 *C. wt.*
57
57
57
5742

Groſs 6426 *lb*
459

Nt. wt. 5967

57 *C. wt.*
8

456 } *Tare of* { 57 *C.*
2 } *Tare of* { 1 *Q.*
1 } *Tare of* { 14 *lb.*

459 Total *Tare*

Or by the GOLDEN RULE, *ſay,*

If 112 *lb. Groſs*, give 8 *lb. Tare*, what will 57 *C.* 1 *Q.* 14 *lb.* or by the leaſt *Ratio* of 112 to 8, *i. e.* 14 to 1, thus:

If 14 . . . 1 . . . 57 *C.* 1 *Q.* 14 *lb.*

57
57
5742

2)6426 *Groſs*

7)3213

459 *Tare*

Nett weight 5967 *lb.*

EXAMPLE

EXAMPLE 2.

Gr. wt. 42 *C.* 2 *qrs.* 21 *lb. Tare* 12 *lb.* per *C. wt.* Quere *lbs. Nett.*

112
12

For 2 Qrs. take 1 half 100 *Nett of* 1 *C. wt.*
42

4200		*Nett of*	42	*C.*
50			2	*Q.*
12	1 *half*		14	*lb.*
6	1 4*th*		7	*lb.*

Totall *Nett* 4268 $\frac{3}{4}$ *lb.*

By the ſecond RULE.

42
42
42
4277

To. *Gr* 4781 *lb*
512 1 4*th*

N.wt. 4268 $\frac{3}{4}$ *lb.*

42
12

504		*Tare of*	42	*C.*
6			2	*Q.*
1	1 *half*		14	*lb.*
	3 4*th*		7	*lb.*

Tare 512 1 4*th*

EXAMPLE 3.

Gr. wt. 39 *C.* 0 *qrs.* 21 *lb. Tare* 11 *lb. per C. wt. Trett* 14 *lb.* in 104 *lb.* Quere *lbs.* Nett.

	112		
	11		
For 14 take 1 8th	101		
	39		
	3939	*oz.*	
For 7 *lb.* 1 *half*	12	10	
	6	5	
Suttle	2)3957	15	
	13)1978	15	$\frac{1}{2}$
Trett	152	3	$\frac{1}{2}$
Nett weight	3805	11	$\frac{1}{2}$

Having taken for *Tare* according to the *Rule*, the Anſwer is *Suttle*, becauſe there is an Allowance for *Trett*, which I divide by 2 and 13, *i. e.* by 26, becauſe 4 *lb.* is 1 26th part of 104, and the *Quotient* is Pounds *Trett*; theſe I ſubtract from the *Suttle*, and the remainder is *Nett* weight.

I hope the *Reader* will not find it difficult to perform this Queſtion both the other ways if he think fit; I ſhall therefore proceed to

VARIETY

VARIETY 4.

If the Groſs *be given in* Hundreds, Quarters, *and* Pounds, *and the* Tare *required in* Hundreds, Quarters, *and* Pounds.

RULE.

Take ſuch parts of the *Groſs* weight as your *Tare* is of a *C. wt.* and the *Quotient* will be the *Nett* weight, if there is no allowance for *Trett* otherwiſe it is *Suttle*; out of which the *Trett* muſt be deducted, and the *Remainder* is *Nett* weight.

EXAMPLE 1.

What is the *Nett wt.* of 37 *C.* 2 *Q.* 12 *lb.* *Tare* 16 *lb. per C. wt.*

	37 C.	2 Q.	12 lb.	
For 16 *lb.* take 1 7th	5	1	13	5 7th *Tare*
Nett weight	32	0	26	2 7th

EXAMPLE 2.

Gr. wt. 26 *C.* 1 *qr.* 14 *lb.* *Tare* 14 *lb. per C. wt.* Quere *C. wt.* Nett.

	26 C.	1 Q.	14 lb.	
14 *lb.* $\frac{1}{8}$	3	1	$5\frac{1}{4}$	*Tare*
N. wt.	23	0	$8\frac{3}{4}$	

EXAMPLE 3.

Gr. wt. 47 C. 1 Q. 8 lb. *Tare* 12 *lb.* per *C. weight,* Quere *C. wt.* Nett.

	47 C.	1 Q.	8 lb.		
14 lb. 1 8th	5	3	18	8	*Tare* for 14 *lb.*
2 lb. 1 7th	0	3	10	10	2 *lb.* deduct
Tare	5	0	7	14	
Nett wt.	42	1	00	2	

EXAMPLE 4.

What is the *Nett* weight of 4 Sacks of Cotton Wool, whoſe Number and Weight is as here under, and *Tare* 4 *lb. per C. weight.*

No. 1.	3 C.	1 Q.	16 lb.		
3.	5	2	14		
4.	2	1	8		Here I take 1 7th of 1 4th for 4 *lb.* according to the *Table* of parts of *C.* weight.
8.	7	3	18		
Total Groſs	19	1	00		
28 lb. 1 4th	4	3	7		
4 lb. 1 7th	0	2	21		*Tare*
Nett weight	18	2	7		

EXAMPLE 5.

What is the *Nett* wt. of 6 Frails of Copper, *viz.*

	C.	*Q.*	*lb.*		*C.*	*qrs.*	*lb.*
No. 2.	5	1	12	No. 14.	6	1	18
3.	6	3	16	25.	7	2	06
7.	5	0	24	34.	5	1	21
	17	1	24		19	1	17
	19	1	17				
57 lb. $\frac{1}{2}$	36	3	13	Tot. *Gr.* *Tare* 8*lb.* per *C. wt.*			
8 lb. $\frac{1}{7}$	18	1	20$\frac{1}{2}$				
	2	2	14$\frac{3}{4}$				
Nett weight	34	0	26$\frac{1}{14}$				

Example

EXAMPLE 6:

Groſs weight 24 *C.* 3 *qrs.* 21 *lb.* *Tare* 5 lb. C. *Trett.* 4 *lb.* in 104 *lb.* Quere Nett *weight.*

	7) 24 C.	3 Q.	21 lb.		
$\frac{1}{4}$ of $\frac{1}{7}$ for 4 lb.	3	2	7		
$\frac{1}{4}$ for 1 lb.	0	3	15	12	*Tare for* *lb.* 4
		0	24	15	1
Sum	1	0	12	11	*Tare*
Suttle	23	3	8	5	
	23				
	23				
	2392				
	2)2668				
	13)1334	0			
	7)102	8	$\frac{16}{26}$		
	4)14	4			
	3	2	18		
Trett	0	3	18		
Nett weight	22	3	18	$\frac{16}{26}$	

Having found the *Suttle* as in other *Examples*, I divide it by 2 and 13, *i. e.* 26, because 4 is 1 26th part of 104, and the Quotient is *Trett*, which I ſubtract from the *Suttle*, and the remainder is *Nett* weight.

SECTION 15.

Of INTEREST.

INTEREST is the Sum reckoned for the loan, or forbearance of ſome Principal Sum, lent for, or due at a certain Time, according to a certain rate of *Intereſt*, and therefore is call'd *Principal*, becauſe it procreates the *Intereſt*, or from which the *Intereſt* is reckon'd, and is either *Simple* or *Compound*.

CASE 1.

Simple Intereſt is that which ariſeth from the *Principal* only, and is now ſettled at 5 *l.* for the uſe of 100 *l.* for one Year, or 12 Months, and therefore the *Intereſt* of any Sum of Money for one Year, is found by the *Single Golden Rule*, thus: If 100 *l.* Principal in 12 Months, give 5 *l.* Intereſt, what Intereſt will any other Principal give in that time: Or uſing the leaſt *Ratio* of 100 *l.* to 5 *l.* *i. e.* 20 to 1, whence this *Rule* for *Simple Intereſt* is eaſily inferr'd.

RULE.

Divide any *Principal* propoſed, by 20, and the *Quotient* will be the *Intereſt* of that *Principal* for one Year; which being multiplied by any number of Years, gives the *Intereſt* for thoſe Years. And if there be any odd parts of a Year, take ſuch parts of the *Intereſt* of one Year, as thoſe parts are of one Year; and the Sum of theſe Quotients will be the Anſwer.

N. B. 1. The eaſieſt and ſafeſt way of Dividing Pounds, Shillings, and Pence by 20, is to Divide by 4, and 5, according to the *Rule* deliver'd in *Compendiums*, but a more expeditious way, (and what if carefully perform'd will ſerve very well) is to divide the Pounds by 20, by cutting off the *Units* Figure, and dividing the other Figures by 2, and if any thing remain, bring it to the Figure cut off for Shillings, as is uſual; and for the odd Shillings and Pence take as in the following *Table*.

	s.	d.		d.
For	10	0	Take	6
	7	6		4½
	5	0		3
	3	9		2¼
	2	6		1½
	1	3		¾
	0	5		¼

The Operation may be yet further abridg'd, when the Years are either an even Number or an *Aliquot* part of 20; for then we can work by the *Ratio* of 20 to the ſaid number of Years.

Some Examples *will make theſe things plain.*

EXAMPLE 1.

What is the *Simple Intereſt* of 346 *l.* 12 *s.* 6 *d.* for 4 Years, at 5 *l. per Cent. per Annum.*

See the OPERATION.

5)346 *l.* 12 *s.* 6 *d.*
4)69 6 6
Intereſt 17 6 7 $\frac{2}{2}$ *for one Year.*

Or by the Ratio *of* 20 *to* 4, i. e. 5 *to* 1:

5)346 *l.* 12 *s.* 6 *d.*
69 6 6

Or thus:

2,0)346 *l.* 12 *s.* 6 *d.*
17 6 7$\frac{1}{2}$
4
Intereſt *l.* 69 6 6

Having Divided the Pounds by 20, as uſual, I take 6 d. for 10 s. and 1 *d.* 2 *qrs.* for 2 *s.* 6 *d.* according to the preceding *Table*, which makes 7 *d.* 2 *qrs.* to ſet down for 12 *s.* 6 *d.*

EXAMPLE 2.

What is the *Simple Intereſt* of 416 *l.* 8 *s.* 9 *d.* for 5 Years, at 5 *l. per Cent. per Annum ?*

4)416 *l.* 8 *s.* 9 *d.*

5)104 2 2 $\frac{1}{4}$

Int. for 1 Year. 20 16 5 $\frac{1}{4}$

5

Anſwer 104 2 2 $\frac{1}{4}$

Or by dividing by 4 only.

4)416 8 9

l. 104 2 2 $\frac{1}{4}$

Or thus:

2,0)41|6 8 9

20 16 5 $\frac{1}{4}$

5

Anſw. 104 2 2 $\frac{1}{4}$

Here having divided the pounds by 20, I take 3 *d.* for 5 *s.* and 2 *d.* 1 *q.* for 3 *s.* 9 *d.* ſo it makes 5 *d.* 1 *q.* for 8 *s.* 9*d.*

EXAMPLE 3.

What comes the *Simple Intereſt* of 367 *l.* 11 *s.* 3 *d.* unto, for 7 Years at 5 *l. per Cent. per Annum.*

	l.	*s.*	*d.*
2,0)	367 *l.*	11 *s.*	3 *d.*
Intereſt for 1 *Year.*	18	7	6$\frac{3}{4}$
			7
Anſwer	128	12	11$\frac{1}{4}$

Here for 10 *s.* I take 6 *d.* and for 1 *s.* 3 *d.* I take 3 *qrs.* which together makes 6 *d.* 3 *qrs.* for 11 *s.* 3 *d.*

EXAMPLE 4.

What will 327 *l.* 17 *s.* 6 *d.* amount unto, in 6 Years, 3 Months, at 5 *l. per Cent. per Annum, Simple Intereſt.*

	l.	*s.*	*d.*	
2,0)	627 *l.*	17 *s.*	6 *d.*	
for 3 months take $\frac{1}{4}$	31	7	10$\frac{1}{2}$	*Int. for* 1 *Year*
			6	
	188	7	3	*Int. for* 6 *Yrs:*
	7	16	11$\frac{1}{2}$	*Int. for* 3 *mo.*
Amount	824	1	8$\frac{1}{2}$	

N. B. The amount of Money at *Intereſt* for a given time, is the Sum of the *Principal* and its *Intereſt* for that time; therefore having found the *Intereſt* for 6 Years, and three Months, I add them two, and the *Principal* into one Sum for the Amount.

EXAMPLE 5.

What is the *Intereſt* of 247 *l.* 8 *s.* for 8 Years, 8 Months, at 5 *l. per Cent. per Annum.*

See the Operation.

247 *l.* 8 *s.*
8

2,0)1979 4

8 mon. $\frac{1}{12}$ 98 19 2 $\frac{1}{4}$ *Intereſt for 8 Years.*
8 4 11 *Intereſt for 8 months.*

Anſwer 107 4 11 $\frac{1}{4}$

N. B. If the Time be leſs than one Year, find the *Intereſt* for one Year, and take parts thereof for parts of a Year.

EXAMPLE 6.

What is the *Intereſt* of 419 *l.* 11 *s.* 8 *d.* for 5 Months, at 5 *l. per Cent. per Annum.*

See the Work.

		20)419 *l:*	11 *s.*	8 *d*			*mo.*
6 *mo.*	$\frac{1}{2}$	)20	19	7		*Intereſt for*	12
1 *mo.*	$\frac{1}{6}$	10	9	9	$\frac{1}{2}$		6
		1	14	11	$\frac{1}{2}$		1
ſubtract							
Anſwer		8	14	10			5

Or, having found the *Intereſt* for 12 Months, by Dividing by 20, ſay by the *Golden Rule*,

If 12 *Months* 20 *l.* 19 *s.* 7 *d.* what 5 *Months* ?

			5	
12)104	17	11		
Anſwer	8	14	9 $\frac{3}{4}$ ‡	$\frac{8}{12}$

The beſt way that I know of for computing Intereſt *for odd Days is by this,*

RULE.

Multiply the *Principal* by the Number of Days, and Divide the Product by the *Ratio* of the *Intereſt* of 100 *l.* for one Year, to the Days in a Year multiplied by 100; which at 5 *l. per Cent:* is 7300. For the leaſt *Ratio* of 365 to 5, is 73 to 1, and 73 multiplied by 100 is 7300; and this is grounded upon the *Double Golden Rule.*

For knowing readily how many Days are in each Month, theſe *Verſes* are to be gotten by Heart.

Thirty Days hath September,
April, June, *and* November;
February *hath Twenty Eight alone,*
All the reſt hath Thirty One:
But when Leap-Year *comes, that time*
February *hath Twenty Nine.*

EXAMPLE 7.

A Bond for 242 *l.* 18 *s.* was dated *September* the 9th, *Anno.* 1731, what is there due for *Principal* and *Intereſt* this 3d Day of *May*, *Anno.* 1732, *Intereſt* being computed at 5 *l. per Cent. per Annum.*

242 *l.* 18 *s.*
237
1700 6
7287
48580
73,00)575,67--6(7
6467
20
1293,46(17
563
5246
12
629,52(
4552(8
4
182,08(2
3608

2,0)14,0
7
2,0)160,0
80

Septem.	21
October	31
Novem.	30
Decem.	31
Janu.	31
Feb.	29
March	31
April	30
May	3
Days in all	237

Principal	242	18	0
Intereſt	7	17	$8\frac{1}{2}$
Anſwer	250	15	$8\frac{1}{2}$

CASE 2.

By knowing the *Intereſt* of a Sum of Money, for any Time, and at any Rate of *Intereſt*, to find the *Intereſt* of the ſame Sum, for the ſame time, at any other Rate of *Intereſt*.

RULE.

As the Rate at which the *Intereſt* is known, is to the *Intereſt* known, ſo is any other Rate, at which the *Intereſt* is ſought to the *Intereſt* ſought.

From this *Rule*, and the laſt preceding *Rule* it is evident, that if the *Intereſt* of a Sum of Money be known for any time, at 5 *l. per Cent. per Annum*, the *Intereſt* thereof for the ſame time may be found at the rate of 4 *l.* and 6 *l. per Cent. per Annum*, by this Compendious *RULE.*

Divide the given *Intereſt by* 5, and if the *Intereſt* be required at 6 *l. per Cent.* add, if at 4 *l. per Cent.* ſubtract that *Quotient* to, or from the *Intereſt* given, and the Sum in the firſt *Caſe*, and Difference in the latter *Caſe* is the Anſwer.

EXAMPLE 1.

If the *Intereſt* of 346 *l.* 12 *s.* 6 *d.* for 4 Years, at 5 *l. per Cent. per Annum*, be 69 *l.* 6 *s.* 6 *d.* what is its *Intereſt* for the ſame time at 6 *l.* and 4 *l. per Cent.*?

See the OPERATION.

5)69 *l.* 6 *s.* 6 *d.*

		13	17	$3\frac{1}{2}+\frac{2}{5}$	
Anſ. at	6 l.	83	3	$9\frac{1}{2}+\frac{2}{5}$	*Sum*
	4 l.	55	9	$2\frac{1}{4}+\frac{3}{5}$	*Difference*

EXAMPLE 2.

If the *Intereſt* of 168 *l.* 16 *s.* 6 *d.* for 6 Years, 3 Months, be 52 *l.* 15 *s.* 2 *d.* 2 *q.* at 5 l. *per Cent.* what will the *Intereſt* thereof for the ſame time be at 6 *l.* and 4 *l. per Cent.*

See the OPERATION.

5)52 *l.* 15 *s.* 2 *d.* 2 *q.*

		10	11	0	2	
Anſwer at	6 l.	63	6	3		*Sum*
	4 l.	42	4	2		*Difference*

EXAMPLE 3.

If the Intereſt be 5 $\frac{1}{2}$ *l. or* 4 $\frac{1}{2}$ *l. per* Cent. *per* Annum.

RULE.

Take 1 10th part of the *Intereſt* at 5 *l. per* Cent. and for 5 *l.* 10 *s.* add, and for 4 *l.* 10 *s.* ſubtract this *Quotient* to or from the *Intereſt* at 5 *l.* and the Sum, or Difference will be the Anſwer.

EXAMPLE 4.

What is the *Intereſt* of 264 *l.* 12 *s.* 11 *d.* for 7 Years, 3 Months, at 5 $\frac{1}{2}$ *l.* and 4 $\frac{1}{2}$ *l. per* Cent. *per* Annum.

See the Work.

	20)264 *l.*	12 *s.*	11 *d.*			
3 months $\frac{1}{4}$	13	4	7 $\frac{3}{4}$	*Intereſt for* 1 *Year.*		
			7		*Y.*	*m.*
	92	12	6 $\frac{1}{4}$	*Inter. for*	7	0
	3	6	2		0	3
	1,0)95	18	8 $\frac{1}{4}$		7	3
	9	1	10 $\frac{1}{4}$			
Inter. at 5 $\frac{1}{2}$	105	10	6 $\frac{1}{2}$	*Sum*		
Inter. at 4 $\frac{1}{2}$	85	6	10	*Difference*		

It ſeems to me very improbable that the rate of *Intereſt* (which is now ſettled at 5 *l. per Cent. per Annum*) ſhould ever (at leaſt in our Days) either exceed 6 *l.* or be leſs than 4 *l. per* Cent. *per* Annum; it would therefore be needleſs, as well as endleſs, to make *Suppoſitions* of this kind. Beſides the *Rules* already laid down, (if well underſtood) will ſerve any Rate of *Intereſt* whatever; I ſhall therefore proceed to

CASE 3.

To find in what time any propos'd Sum will amount unto any other Sum propos'd, at any propos'd rate of Simple Intereſt.

RULE.

Subtract the propoſed Sum from the propoſed Amount; multiply the Remainder by 100 for a Dividend; then multiply the propoſed Sum by the *Intereſt* of 100 *l.* for a *Diviſor*, by which Divide the ſaid *Dividend*, and the *Quotient* is the true time. *This* Rule *is only a contraction of the* Double Golden Rule.

N. B. If the *Intereſt* be 5 *l. per* Cent, inſtead of multiplying the Remainder by 100, and the propoſed Sum by the *Intereſt* of 100*l. viz.* by 5, you my multiply the ſaid Remainder by 20 (for a reaſon given in *Intereſt*) and divide that Product by the Sum propoſed for the Anſwer.

EXAMPLE 1.

In what time will 245 *l.* 3 *s.* 6 *d. amount unto* 281 *l.* 19 *s.* 2 *d. allowing* Simple Intereſt *at the rate of* 5 *l.* per Cent.

See the Operation.

```
             281 l. 19 s.  2 d.
             245     3     6
             ________________
Remainder     36    15     8
                          20
 l.  s. d.   ______________
245  3  6)735    13     4)3 Years
          735    10     6
          _______________
                  2    10 Remainder inconſiderable.
          _______________
```

EXAMPLE 2.

In what time will 127 *l.* 11 *s.* 8 d. amount unto 132 *l.* 7 *s.* 4 *d.* 1 *q.* at 5 *l. per Cent. Simple Intereſt?*

See the Operation.

```
          132   7   4 1/4            4)20
          127  11   8               ______
          ____________             12)34 0
            4  15   8 1/4          ______
                   20 /4           20)113 9
          ____________             ______
           95  13   9                 5 13
                   12
          ____________
127 11 8)1148   9   0(9 Months
         1148   5   0
         ____________
             (0)
```

EXAMPLE 3.

In what time will 124 *l.* 10 *s.* 6 *d.* amount unto 127 *l.* 4 *s.* 1 *d.* 2 *q.* Intereſt computed at 5 *l.* *per* Cent. *per* Annum.

See the Operation.

```
   127   4   1 1/2
   124  10   6 1/2
   ---------------
     2  13   7 1/2        {        00
            20            {    12)30
   ---------------        {    -------
    53  12   6            {  2,0)7,2 6
            12            {    -------
   ---------------        {      3 12

124 10 6)643  10   0(5    {  12)60
         622  12   6      {  -----
         -------------    {  20)125
          20  17   6      {  --------
                  30      {      6  5
         -------------    {
124 10 6)626   5   0(5    {
         622  12   6
         -------------
           3  12   6 Anſw. 5 Mo. 5 Days 1/42
```

N. B. In theſe two laſt *Examplss*, when I had multiplied by 20, the Product was too little to be Divided by the given Sum, which it ſhould be according to the *Rule*; therefore I multiplied by 12, the Months in a Year; and then Divided, and the Anſwer was Months, when I had done ſo, the remainder in the firſt of the ſaid *Examples* was nothing, but in the latter I ſaw it was conſiderable enough to contain ſome Days, ſo I multiplied it by 30, ſuppoſing 30 Days to 1 Month, and Divided again, and the *Quotient* was 5 Days, and there remained about $\frac{1}{42}$ part of a Day.

EXAMPLE 4.

In what time will 126 *l.* 12 *s.* 6 *d.* amount unto 136 *l.* 2 *s.* 5 *d.* 1 *q.* *Intereſt* at 6 *l. per Cent.*

See the Operation.

l. s. d. $\frac{1}{4}$
136 2 5 $\frac{1}{4}$
126 12 6

l. s. d.
126 12 6 | 9 9 11 $\frac{1}{4}$
6 | 100

759 15 0)949 13 9(1
759 15 0

189 18 9
12

2279 5 0(3
2279 5 0

4)100

12)1125

2,0)99,3 9

49 13

Anſwer 1 *Year*, 3 *months*

EXAMPLE

EXAMPLE 5.

In what time will 214 *l.* 8 *s.* amount unto 248 *l.* 14 *s.* 1 *d.* Interest being at 4 *l. per Cent.*

See the Operation.

```
                 248 l.  14 s.  1 d.      12)100
                 214      8     0         -------
               ---------------------      20)60,8  4
214 l. 8 s.       34      6     1         ----------
        4                     100             30   8
-----------    ---------------------
857    12       3430      8    4(4 Year
                3430      8     0
               ---------------------
                                4
```

SECTION

SECTION 16.

Diſcompt or *Rebate.*

DISCOMPT or *REBATE* is when a Sum of Money due at any time to come, is ſatisfied by the Payment of ſo much preſent Money, as being put out at *Intereſt* at the ſame rate, and for the ſame time it was *Diſcompted* for, will amount to the Sum firſt due. So that *Intereſt* and *Rebate* mutually prove each other. Queſtions in *Diſcompt* may be reſolved by this

RULE.

Make 100 *l.* with its *Intereſt* for the Time propos'd, the firſt Term in the *Golden Rul* *Single*; 100 *l.* the ſecond, and the Sum to be *Diſcompted* the third; and the fourth Term will be the preſent Money:

Example

EXAMPLE 1

What preſent Money muſt I receive for 252 *l.* 18 *s.* due at the end of one Year, *Diſcompt* being allowed after the rate of 5 *l.* *per Cent. per Annum.*

See the Operation.

Firſt I add 5 *l.* to 100, and 105. *Then ſay,*

```
If 105 l.     100 l.     252 l. 18 s. { 20)1800
                                100   {  ------
              -----------------       {   90
                    7)25290    0
              -------------------
                  3)3612    17   1 3/4
              ------------------- 1
                  5)1204     5   8 1/2
              -------------------
Anſwer      l.     240      17   1 3/4 -almoſt
              -------------------
```

This by the leaſt *Ratio* of 105 to 100, *i. e.* 21 to 20, or becauſe 21 is an *Unit* more than 20, I divide by 21, *i. e.* by 3 and 7, and ſubtract the *Quotient* from 252 *l.* 18 *s.* and the remainder is the preſent Money.

See the Work.

	7)252 l.	18 s.		
	3)36	2	6	$\frac{3}{4}$
Subtract	12	0	10	$\frac{1}{4}$
Anſwer	240	17	1	$\frac{3}{4}$

EXAMPLE 2.

One is to pay 248 *l.* 12 *s.* 8 *d.* at the end of 9 Months, what muſt be paid in preſent Money, allowing *Diſcompt* after the rate of 5 *l. per Cent. per Annum?*

See the Operation.

4)5 l. 0 s.
Subtract 1 5
3 15 *Interest* of 100 *l.* for 9 Months.
100

If 103 15 100 *l.* 248 *l.* 12 *s.* 8 *d.* { 12)800
4 100 { 20)1266 8
415 24863 6 8 { 63 6
4
415)99453 6 8(239 *l.* 12 *s.* 11 *d*
1645
4003
268
Answer 239 *l.* 12 *s.* 11 *d.* 20
415)5366(12
1216
386
12
415)4640(11
490
$\left(\frac{75}{415}\right)$

This Operation explained.

Firſt, becauſe 9 Months is 3 4th parts of a Year, I take 1 4th part of 5 *l.* and ſubtract it from 5 *l.* and the remainder is the *Intereſt* of 100*l.* for 9 Months; this I add to 100, and the Sum is 103 *l* 15 *s.* for the firſt Term in the *Rule*; and then I proceed according to the *Golden Rule.*

N. B. Becauſe there is 15 *s.* in the firſt Term, which is 3 4th parts of a Pound, I multiply the 103 *l.* by 4, and add 3 to the Product; I alſo multiply the third Term by 4, becauſe the *Rule* requires it, and then proceed.

The laſt another way.

Becauſe multiplying the third Term by 100, and afterwards by 4, is the ſame thing as to multiply by 400, and the difference between 415 and 400 is 15, and the leaſt *Ratio* of 415 to 15 is 83 to 3; therefore I multiply the third Term by 3, and Divide by 83, and ſubtract the *Quotient* from the 3d Term, and the remainder is the Anſwer.

See the Work.

248 *l.* 12 *s.* 8 *d.*

3

83)745 18 0(8

81

20

1638(19

808

61

12

732(8

68

4

272(3

23

248 *l.* 12 *s.* 8 *d.*

8 19 $8\frac{3}{4}+\frac{23}{83}$

Anſwer l. 239 12 $11\frac{60}{83}$

EXAMPLE 3.

What preſent Money will pay a Bill of 369 *l.* 12 *s.* 10 *d.* due 6 Months hence, allowing *Diſcompt* at 5 *l. per Cent. per Annum.*

```
2)5 l.
  2   10   Interest of 100 l. for 6 months:
  100
 ------

If 102l. 10s.   100l.   369l. 12s. 10d.12)1000
       2                          100 {  ------
 --------           ------------------{ 20)1283  4
   205                3964   3   4    {  --------
                                 2    {     64   3
                    ------------------{
                    205)73928·  6   8(360
                       --------
                        1242
                       --------
                         128
                          20
                       -------
                        2566(12
                       -------
                          516
                       -------
                          106  Anſ. 360l. 12s. 6d.
                           12
                       -------
                         1280(6
                       -------
                          50
```

Or becauſe multiplying by 100, and then by 2, is the ſame thing as to multiply by 200, but the difference between 205 and 200 is 5, and the leaſt *Ratio* of 205 to 5, is as 41 to 1; therefore I divide by 41, and ſubtract the *Quotient* from 369 *l.* 12 *s.* 10 *d.* the remainder is the preſent money.

See the work.

```
             41)369l. 12s. 10d.(9  0  3  3/4
                ------------------
                   0   12
                ---------
             41)154(3
                ---------
      309  12  10        31
ſubt.   9   0   3 3/4     4
-----------------------  -----
Anſ.  360  12   6 1/4   124(3
-----------------------  -----
                         (1)
```

EXAMPLE 4.

Bought Goods to the value of 183 *l.* 12 *s.* 4*d.* to Pay at the end of three Months, and it was afterwards agreed to pay preſent Money; what muſt be paid, allowing *Diſcompt* after the rate of 5 *l.* *per Cent. per Annum.*

See the OPERATION.

4)5 *l.* 0 *s*

1 5 *Interest of* 100 *l. for* 3 *months.*

100

If 101 5 100 *l.* 183*l.* 12*s.* 4 *d.* 12)400

4 100

20)1233 4

405 18361 13 4

4 61 13

405)73446 13 4(181

3294

546

141

20

Anſ. 181 6 $11\frac{3}{4}$ 2833(6

403

12

4840(11

790

385

4

1540(3

325

Or thus:

The Difference between 405 and 400 is 5, and the leaſt *Ratio* of 405 to 5, is as 81 to 1; therefore I divide by 9 and 9, and ſubtract, *&c.*

See the Work.

9)183 *l.* 12 *s.* 4 *d.*

9)20 8 0 $\frac{1}{2}$ *almoſt*

Subtract 2 5 4

Anſwer *l.* 181 7 0

E X A M P L E 5.

One is to pay 285 *l.* 14 *s.* 8 *d.* at two 3 months, *viz.* one half at the end of three Months, and the other half at the end of 3 Months more; *i. e.* at the end of 6 Months, what preſent Money muſt be paid, allowing *Diſcompt* after the rate of 5 *l. per Cent. per Annum* ?

Having halved the 285 *l.* 14 *s.* 8 *d.* I proceed to Divide by 9 and 9 for the firſt 3 Months, according to *Example* 4th; and by 41 according to *Example* 3d, and ſubtract for preſent Money.

See

Se the Operations for 3 *Months.*

2)285 *l.* 14 *s.* 8 *d.*

9)142 17 4 *one half the Sum:*

9)15 17 5$\frac{3}{4}$

Subtract 1 15 3$\frac{1}{4}$

l. 141 2 0$\frac{3}{4}$ *For* 3 *Months.*

The Operation for 6 *Mot h*

41)142 *l.* 17 *s.* 4 *d.* (3 9 8$\frac{1}{4}$

19
20

397(9
28
12

340(8

12
4

48(1

7

l.	*s.*	*d.*		
142	17	4		
3	9	8$\frac{1}{4}$		
l. 139	7	7$\frac{3}{4}$	for	6 *months*
141	2	0$\frac{3}{4}$	for	3 *months*
l. 280	9	8$\frac{1}{2}$		*tot. preſent money.*

Example

EXAMPLE 6.

Sold Goods to the value of 324 *l.* 8 *s.* 2 *d.* to be paid at the end of 9 Months, but I having occaſion for Money, we agreed that I ſhould be paid at the end of 4 Months, what muſt I receive then, allowing *Diſcompt* after the rate of 5 *l.* *per Cent. per Annum.*

The true way of anſwering this Queſtion, is firſt to *Diſcount* the whole for the 9 Months, which was the time of payment, according to the firſt contract, then find what that preſent Money will amount unto in 4 Months, which is the time of payment, according to the laſt contract; and that will be the Sum which ought to be paid at 4 Months end. *See the Operation.*

```
324 l. 8 s. 2 d.
          3
-----------------
83)973  4  6(          324    8    2
                        11   14    6 ſubtract
   ---------           ---------------
   143       2,0l.)31,2   13    8 preſent Money
   ---             ------------------1
    60          1/3)  15   12    8 -
    20                               2
  -------             ----------------
  1204(14              5    4    2 3/4 Int. for 4 months
  -------             ----------------
   374         l. 307   9    5 1/4 { Sum to be paid
  -------             ----------------{ at 4 months end
    42
    12
  -------
   510(6
  -------
    12
```

Another

Another Rule for DISCOMPT.

Multiply the Sum to be *Diſcompted* by the time in Months for a *Dividend*, and add the ſaid time

into Mon. $\left\{\begin{array}{c}300\\ 240\\ 200\end{array}\right\}$ for $\left\{\begin{array}{c}4\ l.\\ 5\\ 6\end{array}\right\}$ *per Cent.* for a *Diviſ*

by which Divide the aforeſaid *Dividend*, and ſubtract the *Quotient* from the Sum to be *Diſcompted*, and the remainder is the preſent Money.

EXAMPLE I.

For *Example* here, I will take the firſt *Example* of this *Section*, *viz.* What preſent Money will pay a Debt of 252 *l.* 18 *s.* due Twelve Months hence; allowing *Diſcompt* after the rate of 5 *l.* *per Cent. per Annum* ?

See the Work.

	240	252 *l.* 18 *s.*	252*l.* 18*s* 0*d.*
Add	12	12	12 0 10 $\frac{1}{4}$
	252	3034 16(	240 17 1 $\frac{3}{4}$ *preſent money.*

514

10
20

216(0
12

2592(10

72
4

288(1

36

Here, I firſt multiply 252 *l.* 18 *s.* by 12 Months, that Product is my *Dividend*; then to 240 the number in the Table, I add 12 Months for a *Diviſor*, by which I Divide, and the *Quotient* is the ſame as by the other *Rule*.

EXAMPLE 2.

What is 356 *l.* 9 *s.* 6 *d.* due 5 Months hence, worth in preſent Money, *Diſcompt* at 6 *l. per Cent.*

See the Work.

200
5
———
205

356 *l.* 9 *s.* 6 *d.*
5
———
1782 7 6
———
142
20
———
2847(13
———
797
———
182
12
———
2190(10
———
140
4
———
560(2
———
150

356 9 6
8 13 10 2
———
347 15 7 $\frac{1}{2}$ *preſent money.*

Here I multiply 356 *l.* 9 *s.* 6 *d.* by 5, the number of Months, and the Product I reſerve for a *Dividend*; then I add the ſaid 5 to 200, the *Tabular Number* for 6 *l. per Cent.* and that Sum I make my *Diviſor*, by which I Divide the aforeſaid *Dividend* and ſubtract the *Quotient* from the Sum to be *Diſcompted*, and the remainder is the preſent Money.

The laſt by the Ratio *of* 205 *to* 5, *i. e.* 41 *to* 1, *ſo I divide the Sum to be* Diſcompted *by* 41, *and ſubtract as before.*

See the Work.

41)356 *l.* 9 *s.* 6 *d.*
28
20
569(13
159
36
12
438(10
28
4
112(2
.30

356 *l.* 9 *s.* 6 *d.*
8 13 10 $\frac{1}{2}$
347 15 7 1

N. B. The *Rule* for finding *Tabular Numbers* for any rate of *Diſcompt* is thus:

Multiply 100 *l.* by 12 Months, *i. e.* add two Cyphers to 12, and it makes 1200; which I divide by any rate of *Diſcompt*, and the *Quotient* is the *Tabular Number* for that rate, *e. g.* Suppoſe I would find the *Tabular Number* for 8 *per Cent. Diſcompt.* I divide 1200 by 8, and the *Quotient* is 150, which is the *Tabular Number* for 8 *l. per Cent.* and ſo for any other rate of *Diſcompt.*

SECTION 17.

Compound Intereſt.

COMPOUND INTEREST is that which ariſeth from the *Principal* and *Intereſt* put together, as the *Intereſt* ſtill becomes due; ſo that at every Payment, or at the time when a Payment becomes due, there is created a new *Principal*; and for that reaſon it is called *Intereſt* upon *Intereſt*, or *Compound Intereſt*.

This *RULE* is much better done by DECIMAL than VULGAR ARITHMETICK, and better yet by LOGARITHMS; but neither of theſe methods coming within the compaſs of my preſent deſign, I ſhall content my ſelf with that, which in my opinion is the beſt that can be expected by Vulgar *Arithmetick*, and alſo ſheweth the nature and deſign of *Compound Intereſt*, and is according to this

RULE.

Divide the *Principal* given by 20, according to the method in *Compendiums* in *Diviſion*, and the *Quotient* will be the *Intereſt* for one Year; add this to the given *Principal*, and the Sum will be the amount at the end of the firſt Year, or a new *Principal* at the beginning of the ſecond Year; Divide that *Principal* by 20, after the ſame manner, and add that *Quotient* to the laſt *Principal*, and that Sum will be the amount at the end of the ſecond Year, or a new *Principal* for the beginning of the third Year: Proceed after this manner as often as are the number of Years, and the laſt amount will be the Anſwer.

N. B. This *Rule* finds the *Intereſt* at 5 *l. per Cent.* only, becauſe 5 is 1 20th part of 100, as hath been already obſerv'd; but this *Intereſt* is eaſily reduced at the end of each Year, to the *Intereſt* at any other rate *per Cent.*

EXAMPLE I.

What will 246 *l.* 12 *s.* 8 *d.* amount unto in 4 Years, at 5 *l. per Cent. per Annum?*

	l.	*s.*	*d.*	
	2,0)246	12	8	*Principal given.*
	12	6	7½	*Intereſt for the 1ſt year*
	2,0)258	19	3½	*Firſt Year's Amount.*
	12	18	11¾	*Second Year's Intereſt*
	2,0)271	18	3¼	*Second Year's amount.*
	13	11	11	*Third Year's Intereſt.*
	2,0)285	10	2¼	*Third Year's amount.*
	14	5	6	*Fourth Year's Intereſt.*
Anſwer	299	15	8¼	*Fourth Year's amount.*

EXAMPLE 2.

What will 314 *l.* 6 *s.* 6 *d.* amount unto in 7 Years, computing *Compound Intereſt* after the rate of 5 *l. per Cent. per Annum?*

See the Operation.

	l.	*s.*	*d.*		
	2,0)314	6	6	*Principal given.*	
	15	14	$3\frac{3}{4}$	*Firſt Year's Intereſt.*	
	2,0)330	14	$9\frac{3}{4}$	*Firſt Year's amount.*	
	16	10	$0\frac{1}{2}$	2d Years	*Intereſt*
	2,0)346	10	$10\frac{1}{2}$		*Amount.*
	17	6	$6\frac{1}{2}$	3d *Year's*	*Intereſt*
	2,0)363	17	5		*Amount*
	18	3	$10\frac{1}{2}$	4*th Year's*	*Intereſt*
	2,0)382	1	$3\frac{1}{2}$		*Amount*
	19	2	$0\frac{3}{4}$	5*th Year's*	*Intereſt*
	2,0)401	3	$4\frac{3}{4}$		*Amount*
	20	1	2	6*th Year's*	*Intereſt*
	2,0)421	4	$6\frac{1}{2}$		*Amount*
	21	1	$2\frac{3}{4}$	7*th Year's*	*Intereſt*
Anſwer	442	5	$9\frac{1}{4}$		*Amount*

E X-

EXAMPLE 3.

What will 371 *l.* 10 *s.* 6 *d.* amount unto in 4 Years, at 6 *l. per Cent. per Aunum, Compound Intereſt?* *See the Work.*

	l.	*s.*	*d.*	
2,0)371	10	6		*Principal given.*
5) 18	11	$6\frac{1}{4}$		*Intereſt for the 1ſt Year*
3	14	$3\frac{1}{2}$		
2,0)393	16	$3\frac{3}{4}$		*Firſt Year's amount:*
5)19	13	$9\frac{3}{4}$		*Intereſt for the 2d Year*
3	18	9		
2,0)417	8	$10\frac{1}{2}$		*Second Year's amount.*
5)20	17	$5\frac{1}{4}$		*Intereſt for the 3d Year.*
4	3	$5\frac{3}{4}$		
2,0)442	9	$9\frac{1}{2}$		*Third Year's amount.*
5)22	2	6		*Intereſt for the 4th Year*
4	8	6		
Anſwer 469	0	$9\frac{1}{2}$		*Fourth Year's amount.*

For doing of this, I Divide the *Principal* by 20, for 5 *l.* as before, then I Divide that *Quotient* by 5 for 1 *l.* then I add thoſe two *Quotients* and the *Principal* into one Sum, and that is the Amount at the end of the firſt Year, I do thus as often as there are Years in the time, and the laſt amount is the Anſwer.

EX-

EXAMPLE 4.

What will 248 *l.* 18 *s.* 2*d.* amount unto in 6 Years, at 4 *l. per Cent. per Annum?*

See the Work.

5)248 *l.*	18 *s.*	2 *d.*	*Principal given.*
5)49	15	$7\frac{1}{2}$	
9	19	$11\frac{1}{2}$	*Firſt Year's Intereſt*
5)258	17	$3\frac{1}{2}$	*Firſt Year's amount.*
5)51	15	$5\frac{1}{2}$	
10	7	1	*Second Year's Intereſt.*
5)269	4	$4\frac{1}{2}$	*Second Year's amount.*
5)53	16	$10\frac{1}{2}$	
10	15	$4\frac{1}{2}$	*Third Year's Intereſt.*
5)279	19	9	*Third Year's amount.*
5)55	19	$11\frac{1}{4}$	
11	3	$11\frac{3}{4}$	*Fourth Year's Intereſt*
5)291	3	$8\frac{3}{4}$	*Fourth Year's amount.*

5)58	4	$8\frac{3}{4}$	
11	12	$11\frac{1}{4}$	*Fifth Year's Interest.*
5)302	16	8	*Fifth Year's amount.*
5)60	11	$4\frac{3}{4}$	
12	2	4	*Sixth Year's Interest.*
Anſ. 324	19	0	*Sixth Year's amount.*

Here I Divide the *Principal* by 5 and 5 for 25, becauſe 4 is 1 25th part of 100, and add the *Quotient*, which is the *Intereſt* for one Year to the *Principal*; and continue to do ſo as often as there are Years, and the laſt amount will be the *Anſwer*.

SECTION

SECTION 18.

Equation of Payments.

EQUATION of PAYMENTS is when ſeveral Sums of Money are due at ſeveral times, and the *Debtor* and *Creditor* afterward agree to make but one Payment of the whole; to find at what time it may be paid without loſs to either: for the doing thereof there are two *Rules*, one of them is ſomething eaſier than the other, but not quite ſo true. And tho' neither of them are free from exceptions, yet either of them may ſerve very well in common buſineſs.

RULE 1.

Multiply each Sum of Money by the time it becomes due, and Divide the *S*um of thoſe Products by the Total Debt, and the *Quotient* will be the time at which the Money ought all to be paid.

N. B. If you multiply the ſeveral Sums by Years, Months, or Days, the Anſwer will be accordingly Years, Months, or Days.

RULE

RULE 2.

Firſt find the preſent worth of each particular Sum of *Diſcount*, then find in what time to come the Sum of all thoſe preſent worths will be encreaſed to the Sum of all thoſe particular Sums payable at the ſeveral times to come, and that is the Equated time for payment of the whole Debt.

EXAMPLE 1.

Suppoſe a Merchant bought Goods to the value of 500 *l.* to pay 100 *l.* at the end of three months, 150 *l.* at the end of 6 months, and 250 *l.* at the end of 12 months; but afterwards it was agreed to diſcharge the whole Debt at one Payment; the Queſtion is, at what time this Payment may be made, ſo that neither *Debtor* nor *Creditor* may ſuffer damage, allowing *Simple Intereſt* at the rate of 5 *l. per Cent. per Annum.*

See the Operation by the firſt RULE.

Multiply	100 *l.*	150 *l.*	250 *l.*
	3	6	12
	300	900	3000
			900
			300

5,00)42,00(8

2

30

Anſwer 8 *Months*, 12 *Days.*

5)60(12

60

(0)

The ſame by the ſecond RULE.

Firſt for 100 *l.* in 3 Months *per Example* 4th in *Diſcompt.*

9)100 *l.*

9)11 2 2 $\frac{1}{2}$

Subtract 1 4 8 $\frac{1}{4}$ *Diſcompt for* 3 *months.*

98 15 3 $\frac{3}{4}$ *preſent Money.*

Secondly for 150 *l.* in 6 Months *per Example* 3d in *Diſcompt.*

41)150(3 *l.*

27
20

540(13 s.

130

7
12

84(2 *d*

2

	l.	*s.*	*d.*
	150	0	0
Diſc. for 6 *mo.*	3	13	2
Preſent Money	146	6	10

Thirdly for 250 *lb.* for 12 Months, *per Example 1ſt in Diſcompt.*

	7)250			
	3)35	14	3 $\frac{3}{4}$	
Subtract	11	18	1	*Diſcompt* for 12 Months
				months.
	238	1	11	preſent Money for 12
	147	6	10	preſent Money for 6
	98	15	4	preſent Money for 3
	483	4	1	*Sum of all the preſent worths.*

Then I find in what time this Sum of all the preſent worths will amount to 500 *l.* the whole Debt, *per Sect.* 12 as followeth.

See the Work.

	500 l.	0 s.	0 d.	
Subtract	483	4	1	
	16	15	11	12)100
			20	2,0(11,8 4
	335	18	4	5 18
			12	
483 4 1)	4031	00	0(8	
	3865	12	8	
	165	7	4	12)00
			30	2,0)20
	4961	0	0	
	483	4	1(10	1
	121	15	11	
			6	
	730	15	6 *Anſwer* 8 *Months,* 10	
			4 *Days,* 6 *Hours.*	
	2923	2	0(6	
	2899	4	6	
	33	17	6 *about* $\frac{1}{14}$ *part of an hour.*	

N. B. By comparing theſe two Operations it will appear, that the difference between theſe two *Rules*

Rules for *Equation* of *Payment* is very inconſiderable; being in this *Example* but 1 Day, 13 Hours, and 13 14th parts of an Hour; and this difference (inconſiderable as it is) would have been ſtill leſs, if the Sums to be paid as well as the intervals of the times of Payment had been equal. I ſhall therefore give only two *Examples* more worked by the firſt *Rule* (it being the eaſier) and ſo conclude this *Rule*.

EXAMPLE 2.

A Merchant is to pay 426 *l.* 16 *s.* 6 *d.* at three 3 Months, what is the Equated time for payment of the whole Debt.

N. B. That three 3 Months, is as much as to ſay, the Sum muſt be paid at three equal Payments, three Months aſunder, and the firſt to be 3 Months after the contract.

See the OPERATION.

```
          3)426 l. 16 s. 6 d.
          ---------------
             142    5  6
                       3
          ---------------
             426   16  6
                       6
          ---------------
426  16  6)2560    19  0 (6 Months.
           2560    19  0
          ---------------
                       0
```

Firſt, I Divide the Debt by 3, and the *Quotient* is the Sum which ought to be paid at the end of each 5 Months; which I ſhould have multiplied by 3, 6, and 9, and added thoſe three Products together for a *Dividend*; but inſtead of doing ſo, I have multiplied by 3, and that Product by 6, which laſt Product is the ſame which the Sum of the three aforeſaid Products would have been, and this I Divide by the whole Debt, and the *Quotient* is 6 Months, which is the Equated time for payment of the whole.

EXAMPLE 3.

One is to pay 268 *l.* 17 *s.* 4 *d.* at 4 5 Months, what is the Equated time for payment of the whole Debt?

See the OPERATION.

	4)268 *l.*	17 *s.*	4 *d.*	12)80
	67	4	4	16 8
			50	
268 17	4)3360	16	8	(12 Mon. 15 Days. *Anſ.*
	268	17	4	
	67	2	8	
			10	
	671	6	8	
	537	14	8	
	133	12	0	
		16	8	
	134	18	8	

The *Quotient* is 12 Months, and the remainder being juſt half the *Diviſor*, I call it 15 Days, ſo the Anſwer is 12 Months, 15 Days.

N: B. Having firſt Divided by 4, the number of Payments, inſtead of multiplying the *Quotient* by 5, 10, 15, and 20, according to the *Rule*, and adding thoſe Products together for a *Dividend*, I multiply the ſaid *Quotient* by 50 for a *Dividend*, that Product being equal to the Sum of all the aforeſaid Products; and by ſo doing, and uſing this way of *Diviſion*, I have ſaved above 40 Figures in the Operation of what wou'd have been uſed by the beſt common Method now in Uſe.

SECTION 19.

FELLOWSHIP.

FELLOWSHIP is a *Rule* that teacheth how, by having the ſeveral Stocks of Perſon that are Partners together in Company given to proportion to every one of them his due ſhar of Gain or Loſs; and this falls under the conſideration of two *Caſes*, called *Single* and *Double Fellowſhip*, and firſt of,

CASE 1.

Single FELLOWSHIP.

THIS is when two or more Men make a Stock, and Trade together in Company, Dividing their Gain or Loſs in proportion to their part of the Stook, without any reſpect to the time of continuance in Company.

RULE.

As the Total Stock is in proportion to the whole Gain or Loſs, ſo is each Man's particular Stock to his particular part of the Gain or Loſs.

Or, Divide the whole Gain or Loſs by the total Stock, and multiply the *Quotient* into each Man's particular part of the Stock, and thoſe Products will be each Man's particular part of the Gain or Loſs reſpectively.

EXAMPLE 1.

Three Merchants made a Stock as follow

A } put in { 240 *l.* } They gain'd by Trading 120*l*
B } put in { 360 *l.* } what part of the ſaid gain ought
C } put in { 480 *l.* } each man to have for his ſhare.

Say, If 1080 gain 120 *l.* what 240

```
                                        120
                                       -----
Or by the Ratio of 1080             12, 0)2880,0
to 120, which is 9 to 1.                -----
         9)240                          9)240
        -------                        -------
A's Gain 26  13  4              A's gain l. 26  13  4
```

Now it being diſcovered that the *Ratio* of the total Stock to the whole Gain is 9 to 1, *i. e.* the Gain is juſt 1 9th part of the Stock, it will evidently follow, that each Man's part of the Gain will be juſt 1 9th part of his laying into Company, therefore I divide each Man's part of the Stock by 9, and the *Quotients* are each Man's part of the Gains reſpectively.

See the Work.

9)360				9)480			
B's Gain	l. 40	0	0	C's gain	53	6	8

Proof	A's Gain	26 l.	13 s.	4 d.	The Sum of all their particular Gains being equal to the whole Gains ſheweth the work to be true.
	B's Gain	40	00	0	
	C's Gain	53	06	8	
		l. 120	00	0	

EXAMPLE 2.

Three Men made a Stock as followeth, *viz.*

A	laid into Stock	124*l.*	And they gain'd by Trading 210l. what is each man's part thereof.
B		202	
C		314	
		640	

Say, If 640 gain 210 *l.* what will 124 *l.* gain.

124

840
2520

8,0)2604,0

8)325 10

l. 40 13 9 *A's Gain.*

Again ſay,

If 640 gain 210 what will 202 gain?

202

420
420

8,0)4242,0

8)530 5 0

B's Gain. *l.* 66 5 7 $\frac{1}{2}$

Alſo, If 640 gain 210 what 314

314

2940
630

8,0)6594,0

8)824 5 0

Proof			
C's gain	103	0	7 $\frac{1}{2}$
B's gain	66	5	7
A's gain	40	13	9 $\frac{1}{2}$
	l. 210	0	0

CASE

CASE 2.

Double FELLOWSHIP.

THIS is when two or more Men make a Stock and Trade together, and both their parts of the Stock, and time of continuance in Company are unequal, and it is required to find each Man's part of the Gain or Loſs, according to their part of the Stock, and Time that it continued in Company, to do which this is the

RULE.

Multiply each Man's part of the Stock by the time of its continuance in Company, make the Sum of all thoſe Products the firſt Term in the *Golden Rule*, the whole Gain or Loſs the 2d term, and the Product of each Man's Stock and Time ſeverally the 3d; and the 4th term will be each Man's part of the Gain or Loſs reſpectively.

EXAMPLE

E X A M P L E 1.

Two Tradeſmen made a Stock as followeth, *viz* *A* put in 45 *l.* for 4 Months, *B* put in 60 *l.* fo 9 Months, and they gained 60 *l.* what is each Man's part?

See the Operation.

45
4

A's money multiplied by the Time. 180

60
9

B's money multiplied by the Time. 540

Sum 720

Then, As 720*l.* to 60*l.* ſo 180
60

9,0)1080,0

8)120

A's Gain 15 *l.*

Or by the Ratio of 720 *to* 60, i. e, 12 to 1.

12)180

15 *l.* *A's gain*

Alſo,

lſo, As 720 to 60 ſo 540	*Or, by the afore-*
60	*ſaid* Ratio.
9,0)3240,0	12)540
8)360	*l.* 45 *B's gain*
B's gain l 45	

EXAMPLE 2.

Three Merchants made a Stock as followeth, iz. A put in 84 *l.* for 3 months, B put in 120 *l.* or 6 months, C put in 140 *l.* for 12 months, nd they gained by Trading 124 *l.* 4 *s.* 6 *d.* what part muſt each man have?

See the Work.

84	120	140
3	6	12
A's Product 252	B's Product 720	C's Product 1680
		720
		252
		ſum 2652

Then ſay, As 2652 to 124 *l.* 4 *s.* 6 *d.* ſo 252

```
                    12
         ——————————————
         1490   14   0
        29814    0   0
        ———————————————
  2652)31304   14   0(11 l. 16 s. 1 d.
       ————————————————  A's gain.
         4784
        ——————
         2132
           20
        ——————
        42654(16
        ———————
          222
           12
        ———————
         2664(1
        ———————
           12
```

Here I break my *Multiplier* into 12 and 240; therefore I multiply by 12, and that Product by 20, and add thoſe 2 Products together, &c. *per Variety* 7th.

For B's Gain, ſay,
As 2652 to 124 *l.* 4 *s.* 6 *d.* ſo 720

```
                           720
                  ----------------
Memorandum         2484   10   0
2)9 s.   0 d.     86957   10   0
------------      ----------------
  4    10    2652)89442    0   0(33 l. 14 s. 6 d. 1 q
------------      ----------------  --------------------
2)11   60           9882
------------        ----
  5                 1926
2)15                  20
------------        ----
  7    10          38520(14
                    ----
                   12000
                   -----
                    1392
                      12
                   -----
                   16704(6
                   -----
                     792
                       4
                    ----
                    3168(1
                    ----
                     516
```

Then ſay, As 2652 to 124 *l.* 4 *s.* 6 *d.* ſo 252

```
                                   12
             ——————————————————————
              1490     14     0
             29814      0     0
             ——————————————————————
        2652)31304     14     0(11 l. 16 s. 1 d.
             ——————————————————————      A's gain.
              4784
             ——————
              2132
                20
             ——————
             42654(16
             ————————
               222
                12
             ————————
              2664(1
             ————————
                12
```

Here I break my *Multiplier* into 12 and 240; therefore I multiply by 12, and that Product by 20, and add thoſe 2 Products together, &c. *per Variety* 7th.

For B's Gain, ſay,

As 2652 to 124 *l.* 4 *s.* 6 *d.* ſo 720

	720
Memorandum	2484 10 0
2)9 *s.* 0 *d.*	86957 10 0
4 10	2652)89442 0 0(33 *l.* 14 *s.* 6 *d.* 19
2)11 60	9882
5	1926
2)15	20
7 10	38520(14
	12000
	1392
	12
	16704(6
	792
	4
	3168(1
	516

For C's gain ſay,

As 2652 to 124 *l.* 4 *s.* 6 *d.* what 1680

80

———

9938

19876

———

2652)208698(78 *l.* 13 *s.* 10 *d.* 2 *q.* C's *Gain.*

———

23058

———

1842

20

———

36840(13

———

10320

———

2364

12

———

28368(10

———

1848

4

———

7392(2

———

2088

———

Memorandum:

2)16 *s.* 0 *d.*

———

8

Here for multiplying by 1680 I firſt multiply by 80, by *Compendiums*, then I multiply that Product by 2, ſetting the firſt Figure thereof under the Ten Figure of the other, and add thoſe two Products together.

		l.	*s.*	*d.*	
A's	Gain	11	16	1	0
B's		33	14	6	1
C's		78	13	10	2
Proof		124	4	5	3

N. B. The Sum of all the *Remainders* is juſt equal to the *Diviſor*, and conſequently a meet Farthing, which added to the Sum of all their parts of the Gain, makes the whole Gain; which proves the work to be rightly performed.

SECTION

SECTION 20.

Exchange of Coins.

DEFINITION.

EXCHANGE of COIN is a Commerce of Money, or a *Bartering* or *Exchanging* of the Money of one City or Country againſt that of another; perform'd by means of an Inſtrument in Writing, call'd, *A Bill of Exchange.*

I ſhall not here trouble the Reader with a nice, and (in this place) needleſs enquiry into the nature, firſt invention, and propogation of *Exchange*, or the other curioſities concerning the riſing and falling of *Exchange*, the ſeveral *Rules* for *Drawing*, *Indorſing*, *Preſenting*, *Accepting*, *Proteſting*, &c. *Bills* of *Exchange*, their times of payment, and ſeveral other particulars, which may be met with n Books treating on this ſubject, eſpecially in a Book entitled, *A General Treatiſe of Monies and Exchanges*; out of which Book ſeveral of the followng particulars are collected. But ſhall content myſelf with giving a ſhort account,

1. Of the Diviſion of Money into Real and Imaginary.

2. Of the *Par* of *Exchange*.

3. Of the Ageo, or difference between the *Bank* and current Money of a Nation.

4. Of the current Coin of ſome of the principal Countries in *Europe*, and of their Exchanges with *England*.

And 5. Shew how the *Rules* of *Arithmetick* are applied to the Calculation of *Exchanges*, in Variety of uſefull Queſtions upon that ſubject.

1. Money is divided into two ſorts, Imaginary and Real.

By Imaginary Money is underſtood all the Denominations uſed to expreſs any Sum of Money, which is not the juſt value of any real Species, and ſo a *Noble*, a *Mark*, a *Pound*, are Imaginary Sums in *England*, becauſe there is no Species current in this Kingdom preciſely of their Value.

By Real Money is meant any real Species or Pieces of Money current in this or any other Country, at a certain Price; ſo that notwithſtanding the different Species and ſorts of it in every Nation, any Piece of real current Money whatſoever may fall under this General Definition of a certain Quantity of Metal, coined by the Authority of the State, and current at a certain Price, by Virtue of the ſaid Authority, and of its own intrinſick value, ſuch as a Guinea, a Crown, a Shilling, a Farthing, &c.

2. The *Par* which is of two ſorts, *viz.* that of *Real Monies*, and that of *Exchange*, or of *Imaginary Monies*, and both theſe come to the ſame thing, becauſe the one has a neceſſary dependance upon the other.

By the *Par* of Real Money is meant the equality of the intrinſick value of the real Species of any Countrey, with thoſe of another, and ſo a *French*

Crown in Species is equal to four Shillings and Sixpence *Engliſh*.

By the *Par* of *Exchanges* is underſtood the proportion that the imaginary Monies of one Country, bears to thoſe of another; and ſo ſuppoſing the *French* Crown in Specie to be current in *France* at 72 *Solzs Tournois*, their Crown conſiſting of 3 *Livres* or 60 *Solzs Tournois* is only worth 3 *s.* 9 *d.* or 45 *Engliſh* Pence.

3. Of the *Ageo*. In all places where they have a publick *Bank*, they have two Appellations for their Money, *viz.* *Bank*, and *Current*; Bills of *Exchange* are paid in *Bank* Money, and other Payments in Merchandizing are made in Groſs or Current Money.

Bank Money is commonly valued from about 1 to 8 *per Cent.* better than current Money, and the difference between *Bank* and Current Money is called the *Ageo*, and often riſes and falls according to the Occurrences of Trade.

4. 5. And this brings me in the 4th and 5th places (for I ſhall take thoſe two Articles together) to give *Tables* of the current Coin of ſome of the principal Countries of *Europe*, and of the *Par* of *Exchange* with *England*; and alſo to ſhew how the *Golden Rule* and *Practice* are applied to the Calculation of *Exchange*, in variety of Queſtions on that ſubject.

Exchange of Money is performed by this general RULE.

Make the Money that is to be Exchanged the third Number in the *Golden Rule*, and that Term of the rate of *Exchange* which is of the ſame kind with it, *i. e.* the ſame Country Money, the firſt

Number, and the other Term of the ſaid rate the ſecond Number, and work as in the *Golden Rule*, and you will have the Anſwer.

N. B. If the firſt Number in this Proportion be at any time an *Unit* or 1, that Queſtion may be done by *Practice*.

In *Holland* they have two Denominations for their Money generally in Trade, *viz. Guilders, Stivers, Pennicks*, and *Pounds, Shillings*, and *Pence, Groats*.

Their Pounds, Shillings and Pence, are Divided as ours are, *viz.* their Pounds into 20 Shillings, their Shillings into 12 Pence; their other Money is thus Divided.

16 *Pennicks*	make	1 *Stiver*	
20 *Stivers*		1 *Guilder*	

Alſo,

6 *Stivers*	make	1 *Shilling*	*Flemiſh*
6 *Guilders*		1 *Pound.*	

Before I proceed to the *Exchanges* with *Holland*, it may not be amiſs to ſhew how the current money of *Holland* may be reduced to *Bank Money*, and the contrary.

Current Money is reduced into Bank Money by this

RULE.

As 100 Current Money with the *Ageo* added to it, is to 100 Bank money, ſo ſhall the given current money be to the Bank money.

E X A M P L E

Suppoſe 8294 *Guild.* 17 *Stiv*: current Money were to be reduced into Bank Money, the *Ageo* 5 1 4 h *per Cent.* Say,

As 105 $\frac{1}{4}$ is to 100, ſo is 8294 *Guild.* 17 *Stiv.*

```
   4   4          4           400 { |20)800
 -----          -----             { ------  ----
  421            400              {          48
                -----
             421) 3317920  00 (7881
                 ---------
                   3709
                 ----------
                   3412
                 --------
                    440
                   -----
                     29
                   -----
                     20
                   -----
                   597(1
                   -----
                   176
                    16
                  -----
                  2816(6
                   -----
                    290
                   -----
```

Anſwer 7881 *Guild.* 1 *Stiv.* 6 *Pen. Bank Money.*

To reduce Bank Money to current Money.

Reduce 5729 *Guilders* Bank Money, into current Money, *Agio* 5 *per Cent*. Say,

As 100 is to 105, ſo is 5729.

1 } 286 9

20

Anſwer *Guild.* 6015 9 *Stiv.*

ENGLAND Exchanges with HOLLAND.

The *Par* of Exchange with *Holland* is 20 Shillings *Sterling* for 33 *s.* 4 *d. Flemiſh.*

EXAMPLES.

A Merchant at *Amſterdam* is to pay a *London* Bill, value 284 *l.* 5 *s.* *Sterling*, Exchange at 33 *s.* 3 *d. per Pound Sterling*; what muſt the Merchant pay at *Amſterdam*?

See the Work.

If 1 *l.* give 33 *s.* 3 *d.* what 284 *l.* 5 *s.*?

4 12 4

4 399 1137

399

Here becauſe there is an odd 5 *s.* in the 3d Number, I reduce the 1ſt and 3d Numbers to 5 Shillings, by multiplying both by 4.

10233

10233

3411

4)453663

12)113415 3

20)945,1 3

Anſwer *l.* 472 11 3 $\frac{3}{4}$ *Flemiſh*

Or by Practice, *thus*:

284 *l.* 5 *s.* at 33 *s.* 3 *d.*

		16			
		454	8		
		14	4		
1 *s.*	$\frac{1}{20}$	3	11		
			8	3	$\frac{3}{4}$
3 *d.*	$\frac{1}{3}$				
5 *s.*	$\frac{1}{4}$	*l.* 472	11	3	$\frac{3}{4}$ *Anſwer*

How many *Gilders*, *Stivers*, and *Pennicks*, will pay a Bill of 365 *l. Sterling*, Exchange at 33 *s.* 4 *d. Flemiſh, per Pound Sterling?*

See the Operation.

365 *l.*
5
3)1825

Here I multiply by 5, and divide by 3, becauſe 3 *Nobles* is 20 *s.* and 5 *Nobles* is 33 *s.* 4 *d. Flemiſh.*

Anſwer l. 608 6 8

Now to Reduce this Flemiſh *Money into* Gilders, *&c. take this*

RULE.

Multiply the *Flemiſh* Pounds and Shillings by 6, and it will produce *Gilders* and *Stivers*; for 6 *Gilders* makes 1 *l. Flemiſh*, and 6 *Stivers* is 1 *s. Flemiſh*; and if there be any odd Pence, multiply them by 8 for *Pennicks*; therefore

608 *l.* 6 *s.* 8 *d.*
6

3649 16
4 for 8 *Pennicks.*

Anſwer 3650 00 *Gilders.*

FRANCE.

At *Paris*, *Lyons*, *Rouen*, &c. they keep their Accompts in *Livres*, *Sols*, and *Deniers*, and Exchange upon the Crown, the *Par* of which with *London* in *Sterling* Money is 4 *s.* 6 *d.*

Note,	12 *Deniers,*	makes 1	*Sol*
	20 *Sols,*		*Livre*
	3 *Livres,*		*Crown*

Examples

EXAMPLES.

How much *Sterling* Money muſt I pay at *London*, to receive in *Paris* 468 Crowns, Exchange at 53 *d. Sterling*, *per* Crown?

Say, If 1 Crown   53 *d.*   468 Crowns.

53

1404
2340

12)24804

2,0)206,7

Anſwer *l.*103 7

Or by Practice
(5468 at 4 s. 5 d.

4 *d.*	1 12th	93	12
1 *d.*	1 4th	7	16
		1	19
	l.	103	7

A Traveller at *London* delivered 316 *l.* 16 *s.* 4 *d. Sterling*, to receive its value at *Lyons*, Exchange at 5 *s.* 6 *d. Sterling*, *per Crown*; what muſt he receive there, and whether does he gain or looſe, and how much *per Exchange*?

See the Work.

If 56 *d.* 33 *Liv.* 316 *l.* 16 *s.* 4 *d.*

20

6336

12

76036

3 *Li.* 8*o.*

8)228108 *Anſ.* 4073 7 $\frac{8}{56}$

7)28513 4 $\left\{\begin{array}{l}20\\20\end{array}\right.$

4073 2

8)400 0

7)50 1 $\Big\}$ 8

7

Then the Traveller giving 2*d. Sterling* above *Par* for every Crown, muſt loſe by the *Exchange*, and to know how much, Say,

If 3 *Li.* loſe 2 *d.* what 407,3 *l.* 7 *s.* $\frac{8}{56}$

2 *d.* is $\frac{1}{120}$ 33 18 10$\frac{3}{4}$

Loſs to the Traveller $\frac{1}{3}$ *l.* 11 6 3$\frac{1}{2}$

ITALY

ITALY.

England gives to *Genoa* 46 *d.* to 76 *d. Sterling*, for one Piece of Eight of 5 *Livres*.

To *Leghorn* 43 *d.* to 78 *d. Sterling*, for one Piece of Eight of 6 *Livres*.

They keep their Accompts in *Livres*, *Sols*, and *Deniers*, and Exchange upon the Piece of Eight, the *Par* of which with *London* is 4 *s.* 6 *d Sterling*.

EXAMPLES.

How much *Sterling* Money muſt I pay at *London*, if I receive at *Genoa* 586 Pieces of Eight, Exchange at 53 *d.* 2 *q. Sterling*, *per Piece* of $\frac{8}{8}$

If 1 Piece of $\frac{8}{8}$ give 53 $\frac{1}{2}$ *d.* what will 586 give?

6*d.* 1 40*th* 586

2 *q.* 1 12*th* 14 13

9

131 17

ſubtract 1 4 3'''

Anſwer l. 130 12 9

London draws a Bill upon *Genoa* for the value of 347 *l.* 16 *s.* 6 *d. Sterling*, Exchange at 55 *d. Sterling*, *per* Piece of Eight; what muſt be paid at *Genoa* for that Draught?

55 *d.* 5 *Livres* 347 *l.* 16 *s.* 6 *d.*
20
6956
12
11)83478

Here inſtead of Multiplying by 5, and Dividing by 55 I divide by 11 only.

Anſw. Livres 7588 18 2 $\frac{2}{11}$

Legborn remits to *Briſtol* 2719 *Livres*, 12 *Sols*; Exchange at 54 *d.* 2 *q. per* Piece of Eight, what muſt be received at *Briſtol.*

6 *Liv.* 54 *d.* 2 *q.* 2719 *Liv.* 12 *Sols.*
20 2 20
120 109 54392
109
12,0)592872,8
2)49406
12)24703
2,0)205,8 7
l. 102 18 7 $\frac{1}{15}$ *Anſwer.*

England gives to *Venice* 52 *d.* to 69 *d. Sterling*, for one *Ducat* of 24 *Groſs Banco.*

To *Florence* 49 *d.* to 83 *d. Sterling*, for one Crown of 7 *Livres* and a half *per* Crown.

EXAMPLES.

London remits to *Venice* 282 *l. Sterling*, the Exchange at 52 *d.* Sterling *per Ducat Banco* of 24 *Groſs*; how much will this remittance come to at *Venice?*

Ducat 1763 1 6 *Banco*, which Divide by 5 gives the *Agio*, which added to the *Banco* gives Current Money, which this remittance comes to at *Venice*, as underneath.

5)1763 1 6 *Bank*
352 12 3 *Agio*

2115 13 9 *Current Money*

382 *l.* Sterling
240

52)91680(1763
396

328

160

4

20

80(1

28
12

336(6

24

SPAIN.

Spain gives to *England* the *Piaſtre*, or Piece of Eight for between 55 and 60 *d.* Sterling.

In *Madrid*, *Seville*, &c. they keep their Accompts in *Rials* and *Mervaides*. The *Par* with *London* is 4 *s.* 6 *d.* Sterling, per Piece of Eight.

$$\left.\begin{array}{r}372\ \textit{Mervaides}\\ 8\ \textit{Rials}\end{array}\right\}\text{makes } 1\left\{\begin{array}{l}\textit{Rial}\\ \textit{Piece of } \tfrac{8}{8}\end{array}\right.$$

EXAMPLES.

What Sterling Money may I draw for upon *London*, I paying 2742 *Rials*, 164 *Mervaides* at *Madrid*, Exchange at 54 *d.* Sterling, per Piece of Eight.

See the Work.

```
8 Rials   54 d.   2742 Reas. 164 Mervaides
372                372
----               ----
2976               5648
                  19194
                  8226
                  -------
                  1020188
                       54
                  -------
                  4080752
                 5100940
                 --------
        2976)55090152(    12)18511
                  .....     -----
                 --------  2,0)154,2   7
                  25330        -----------
                 --------- Ans. l.77  2  7  1
                  15221         -----------
                 --------
                    3415
                   ------
                    4392
                   ------
                    1416
                       4
                   ------
                    5664(1
                   -------
                    2688
```

PORTUGAL.

England gives to *Liſbon* and *Oporto*, 50 *d.* to 78 *d.* Sterling, for 1000 *Reas*, or one *Millrea*; the *Par* of which with *London* is about 6 *s.* 8 *d.* 2 *q.* Sterling. 1000 *Reas* is one *Millrea.*

EXAMPLE.

London remits to *Liſbon*, or *Oporto*, 826 *l.* 16 *s.* Sterling, Exchange at 6 *s.* 4 *d.* Sterling *per Millrea*, what muſt be received at *Liſbon* or *Oporto*.

See the OPERATION.

```
6 s. 4 d.        1000 Reas.        826 l. 16 s.
12                                  20
-----                              -------
76                                 16436
                                      12
                                   -------
                                  197232
                                    1000
                                  --------
                               76)197232000(2595157
                                  --------
                                   452
                                 ----------
                                    723
                                 ----------
                                    392
                                 ----------
                                     120
                                     440
                                   -------
                                     600
                                   -------
                                      68
```

Anſwer 2595157 *Reas*, value of this Remittance in *Liſbon* or *Oporto*.

IRELAND.

England gives to *Ireland* 100 *l.* Sterling for 104 *l.* to 114 *l.* Sterling.

EXAMPLES.

London remits to *Dublin* 475 *l.* Sterling, to receive for every 100 delivered at *London* 108 $\frac{1}{2}$ at *Dublin*, what muſt be received there?

```
100 l.        108 1/2        475 l.
  2             2             17
-----         -----          -----
200           217        2,00)80,75
                              -----
475 l.                        40   75
 40  7  6                          20
-----------                   -------
l. 515  7  6 to be receiv'd  200)1500
---------    at Dublin.       -------
                               7  6
```

Here becauſe the Number I am to Multiply by, *viz.* 217, exceeds the Number I am to divide by, *viz.* 200 by 17; therefore I multiply by the difference 17, and Divide by 200, and the Anſwer is 40 *l.* 7 *s.* 6 *d.* which is the advance of that remittance, which I add to the 475 *l.* and the Sum is what muſt be received in *Ireland* for that remittance.

Dublin remits to *London* 515 *l.* 7 *s.* 6 *d.* to receive for every 108 *l.* $\frac{1}{2}$ — 100*l.* what muſt be received there?

```
108 1       100 l.   515 l. 7 s. 6d.
    -
  2 2         2              200   2,0)150,0
----        ----            ----   ---------
217         200                           75
              217)103075 0 0(475 l.
                  -----------
                    1627
                    ----
                    1085
                    ----
                       0
```

So there muſt be received at *London* 475 *l.*

N. B. London Exchanges with the *Engliſh* Plantations in *America* in the ſame manner as upon *Ireland*, at ſo much per *Cent.* receiving always the uncertain ſum abroad, & delivering the certain at *London.*

SECTION 21.

AN
APENDIX
CONTAINING

Variety of Compendious Methods for caſting up all ſorts of Merchandiſe, with their Uſes in ſeveral Queſtions in moſt principal concerns of Life.

COMPENDIUM 1.

BY knowing the Price of one Penny weight *in Farthings, to find what* 1 lb. *will coſt.*

RULE.

Take 1 4th of the Price of one *Penny weight* in Farthings, and the *Quotient* will be Pounds.

EXAMPLE.

If 1 *p.wt.* of Silver be worth 3*d*.1*q*. what's 1*lb*. worth
Price 13 Farthing

$\frac{1}{4}$ 1 *l*. 3 5

If the Quantity be any Number of *lbs.* find the value of 1 *lb.* by this *Rule*, and multiply that by the Number of *lbs.*

If 1 *p. wt.* coſt 4 $\frac{3}{4}$ what will 24 *lb.* coſt?
Farthings 19 *Fart h.*

$\frac{1}{4}$ 4 15 *price of* 1 *lb.*
6

28 10
4

Anſwer *l:* 114 0

COMPENDIUM 2.

By knowing the price of an Oz. Troy *in Farthings, to find the price of* 100 lb.

RULE.

To the Number of Farthings which the *Oz.* coſt, add 1 4th of it ſelf, and the Sum will be the Anſwer in Pounds.

EXAMPLE.

At 7 *d.* 1 *q. per Oz.* what will 100 *lb.* coſt?

29 *Farthings*
$\frac{1}{4}$ 7 5

Anſwer *l.* 36 5

COMPENDIUM 3.

By knowing the price of an Ounce in Pence *or* Farthings, *to find the price of* 112 lb.

RULE.

To the Price of 1 *Oz.* in Farthings, add 4 times the ſaid Farthings, doubling the firſt Figure for Shillings, that Sum will be the Anſwer.

EXAMPLES.

At 5 *d.* 3 *q. per Oz.* what coſt 112 *lb.*?

23 *Farthings*
9 4

l. 32 4 *Anſwer*

At 6 *d.* 1 *q. per Oz.* what coſts 4 *C.* 1 *Q.* 4 *lb.*

25 *Farthings*
10

35 *value of* 1 *C.*
4

140
1 *Q.* 1 4th 8 15
4 *lb.* 1 7th 1 5

Anſwer *l.* 150 0

COMPENDIUM 4.

By knowing the Price of an Ounce Troy *in* Pence *or* Farthings, *to find the price of* 120 lb.

RULE.

To the Farthings which the Ounce coſts, add half of the ſaid Farthings, that Sum is the Anſwer.

EXAMPLES.

At 13 *d.* 1 *q. per Oz.* what coſts 120 *lb.*

```
   4
 ----
  53
  26    10
 ----
l. 79   10 Anſ.
```

AVOIRDUPOIS *Weight.*

COMPENDIUM 5.

By knowing the price of an Ounce *in* Pence *or* Farthings, *to find the price of* 100 lb.

RULE.

To the Right Hand of the Farthings, which the *Ounce* coſt, add a Cypher; divide that by 6, and the *Quotient* will be the Anſwer.

EXAMPLE.

At 2 *d.* 1 *q. per Oz.* what coſts 100 *lb.*?

```
  6)90 Farthings
  ----
l. 15  Anſwer.
```

If the Pounds you would find the Price of, be more or leſs than 100, find the price of 100 by this *Rule*, then take ſuch a part of the ſaid Price, as your Pounds are of 100.

EXAMPLE.

It 1 *Oz. of Coffee* coſt 2 $\frac{3}{4}$ what coſts 24 *lb.*

		6)110			
20 *lb.*	$\frac{}{5}$	18	6	8	*Price of* 100 *lb.*
4 *lb.*	1	3	13	4	
	5	0	14	8	
Anſwer	*l.*	4	8	0	

At 11 *d.* the Ounce what will 125 coſt

		6)440 *F.*			
25 *lb.*	1 4*th*	73	6	8	*Price of* 100
		18	6	8	
Anſwer	*l.*	91	13	4	

COMPENDIUM 6.

By knowing the price of an Ounce *in* Farthings, *to find the price of* 112 *lb.*

RULE.

Divide the Price of an *Ounce* in Farthings by 5, and multiply that *Quotient* by 7, to that Product add one third part of it ſelf, and the Sum is the Anſwer.

EXAMPLE.

If 1 *oz.* of *Coffee* coſt 4 *d.* 1 *q.* what 112 *lb.* coſt?

5)17

3 8
7

$\frac{1}{3}$ 23 16
7 18 8

l. 31 14 8 *Anſwer*

COMPENDIUM 7.

By knowing the Price of an Ounce in Farthings, to find the Price of 120 *lb.*

RULE.

Multiply the Price of an Ounce by 2, and the Product will be the Anſwer.

EXAMPLE.

If 1 *Oz.* of *Cinnamon* coſt 7*d.* 2*q.* what 120*lb.* coſt?

30

60 *l. Anſwer*

Hence it is eaſy to obſerve that 60 *lb.* will coſt juſt as many Pounds as the *Oz.* coſt Farthings, and any *Multiple* of 60, ſuch a *Multiple* of the ſaid Pounds as the given Number is of 60, and any *Aliquot* part of 60 will coſt ſuch an *Aliquot* part of thoſe Pounds as the given Number is of 60.

EXAMPLE.

Chocolate at 5*d.* 3 *q.* *per Oz.* what 180 *lb.* coſt?

23 ⎧ For 180 is 3 times 60 ;
3 ⎨ therefore they muſt coſt
——— ⎨ 3 times as many Pounds
l. 6[illegible] *Anſ.* ⎩ as the *oz.* coſt Farthings.
———

Nutmegs at 8 *d.* 1 *q.* *per Oz.* what coſt 15 *lb.*

33
———
15 *lb.* $\frac{1}{4}$ 1. 8 5
———

COMPENDIUM 8.

***By knowing the Price of* 112 lb. *to find the price of* 1 Ounce.**

RULE.

Multiply the Price of 112 *lb.* by 5, and Divide that Product by 7, and 1 4th of that *Quotient* ſubtracted from itſelf is the Anſwer in *Farthings*

EXAMPLE.

If 112 *lb.* of *Coffee* coſt 31 *l.* 14 *s.* 8 *d.* what will 1 *Ounce* coſt?

31 *l.* 14 *s.* 8 *d.*
5

7)158 13 4

4)22 13 4

Subtract 5 13 4

Anſ. *Far.* 17 00 | *or* 4*d.* $\frac{1}{4}$

COMPENDIUM 9.

By knowing the Price of 120 *lb. to find the Price of* 1 Ounce.

RULE.

Divide the Price of 120 *lb.* by 2, and the *Quotient* will be the Anſwer in *Farthings.*

EXAMPLE.

If 120 *lb.* of *Cinnamon* coſt 60 *l.* what 1 *oz.* coſt?

$\frac{1}{2}$ 30 *qrs.* or 7*d.* 2*q.* *per Oz.*

N. B. That the Pounds which 60 *lb.* coſts will be the Farthings which 1 *Ounce* will coſt.

COMPENDIUM 10.

By knowing the price of one lb. &c. *in* Farthings, *to find the price of* 112 *lb.* &c.

RULE.

Set down the Farthings which the Pound coſt, doubling the *Unit* Figure for Shillings, to which add 1 6th of itſelf for the Anſwer.

EXAMPLES.

If 1 *lb.* of Sugar coſt 4 *d.* 2 *q.* what 112 *lb.* coſt?

		1	16
	$\frac{1}{6}$		6
Anſwer		*l.* 2	2

What coſt 3 *C.* 1 *Q.* 7 *lb.* of Cotton Wool at 9 *d.* 2 *q.* per *lb.*

$\frac{1}{6}$		3	16			
		0	12	8		
1 *Q.*	$\frac{1}{4}$	4	8	8		*Price of* 1 *C. wt.*
7 *lb.*	$\frac{1}{4}$	8	17	4		*Price of* 2 *C. wt.*
		1	2	2		
			5	6	$\frac{1}{2}$	
Anſwer		*l.* 15	13	8	2	

COMPENDIUM II.

By knowing the price of 1 *in* Farthings, *to find the Price of* 120.

RULE.

Take 1 8th part of the Price of 1 in Farthings for the Anſwer.

EXAMPLES.

What coſt 120 Barrel Boards at 3 *d.* 1*qs per* Board?

8)13

Anſwer *l.* 1 12 6

120 Ells of *Muſcovy* Cloth at 9*d.* 3*q. per* Ell.

8)39

4 17 6 *Anſwer*

160 Ells of *Canvas* at 17 *d.* 1 *q. per* Ell.

8)69

40 is $\frac{1}{3}$	8	12	6	price of	120 *Ells.*
	2	17	6		40
Anſwer *l.*	11	10	0		

COM-

COMPENDIUM 12.

By knowing the Price of 112, to find the price of 1.

RULE.

Bring the Price into Groats, and take 1 7th thereof for the Anſwer in Farthings.

Or, To twice the Price of 112 add 1 7th of itſelf, and the Pounds of that Sum will be Pence in the price of 1, and every 5 *s*. will be a Farthing.

EXAMPLE.

If 112 *lb*. of Sugar coſt 2 *l*. 2 *s*. what 1 *lb*. coſt?

2 2
$\frac{1}{7}$ 6

Anſwer *l*. 4 10 *or* 4 *d*. 2 *q*. *per lb*.

Here the 4 *l*. is 4 *d*. and 10 *s*. is 2 *q*.

If 1 *C. wt.* of Hops coſt 5 *l*. 5 *s*. what 1 *lb*. coſt?

$\frac{1}{7}$ 5 5
0 15

Anſwer 11 5 *or* 11 *d*. 1 *q*. *per lb*

Of

Of GOODS ſold by the 1000 *Weight.*

COMPENDIUM 13.

By knowing the price of 1 *in Farthings, to find the price of* 1000.

RULE.

To the Price of 1 in Farthings add 1 4th of 1 6th of itſelf for the Anſwer.

EXAMPLES.

If 1 Lemon coſt 1 *d.* 3 *q.* what coſts 1000 ?

	7		
1 4th	1	15	
1 6th		5	10
Anſwer	*l.*7	5	10

If 1 Dozen of ſmall Needles coſt 4 d. 3 q. what will 1000 Dozen coſt ?

	19		
$\frac{1}{4}$	4	15	
$\frac{1}{6}$	0	15	10
	19	15	10

If the price be given in Pence.

RULE.

To 4 times the Price of 1 in Pence add 1 6th of the ſaid Price for the Anſwer.

EXAMPLE.

If 1 Coney Skin coſt 5 d. what will 1000 coſt?

5
4

20
0 16 8

Anſwer *l.* 20 16 8

If 1 Ell of Sail Cloth coſt 7 *d.* 3 *q.* what will 1000 Ells coſt?

$\frac{1}{6}$ 7 *l.* 15 *s.*
4

31 0
1 5 10

Anſwer *l* 32 5 10

COMPENDIUM 14.

By knowing the price of 1000 *to find the price of* 1.

RULE.

From the price of 1000 Subtract 1 5th of 1 5th of the ſaid Price, and the remainder is the Anſwer in Farthings.

EXAMPLES.

If 1000 Copper Spangles coſt 19 *l.* 15 *s.* 10 *d.* what will 1 coſt ?

	$\frac{1}{5}$	3	19	2
	$\frac{1}{5}$	0	15	10
Anſwer	*Farth.*	19	0	0 *or,*
				4*d.* 3*f*

Of GOODS ſold by Five Score to the Hundred.

COMPENDIUM 15.

By knowing the price of 1 *to find the price of* 100.

RULE.

To the right hand of the Price in Farthings, annex a Cypher; then take 1 8th of 1 12th thereof for the Anſwer.

EXAMPLES

EXAMPLE.

If 1 Croſs Bow Thread coſt 2 *d.* 1 *q.* what 100 coſt?

12)90

$\frac{1}{8}$ 7 10

$\frac{1}{8}$ *l.* 0 18 9 *Anſwer*

COMPENDIUM 16.

By knowing the price of 100 *to find the price of* 1.

RULE.

To 8 times the Price add 1 5th of itſelf, and that Sum is the Anſwer in Farthings.

If 100 coſt 2 *l.* 18 *s.* 4 *d.* what will 1 coſt?

8

$\frac{1}{5}$ 23 06 8

4 13 4

Anſwer 28 0 0 *or* 7 *d.*

Of

Of Goods ſold by the Groſs containing 24 Pieces, and each Piece 36 Yards.

COMPENDIUM 17.

By knowing the price of 1 *to find the price of a* Groſs.

RULE.

Multiply the Price of 1 in Farthings by 9, and double the firſt Figure of the Product, and 'tis done.

EXAMPLE.

Incle at 5 Farthings *per* Yard, what coſt 1 Groſs?
9
l. 4 10 *Anſwer*

COMPENDIUM 18.

By knowing the price of a Groſs to find the price of 1.

RULE.

To the Price of the *Groſs* add 1 9th of itſelf, and that Sum is the Anſwer in Farthings.

EXAMPLE.

If 1 Groſs coſt 4 *l.* 10 *s.* what will 1 Yard coſt?
$\frac{1}{9}$ 0 10
Anſwer 5 *Far.*

If 1 Groſs coſt 6 *l.* 12 *s.* 9 *d.* what 1 *Yd.* coſt?

$\frac{1}{6}$ 0 14 9

Anſwer Farthings 7 7 6 or 1 *d.* 3 *q.* $\frac{15}{20}$ of a *Far.*

Of GOODS ſold by the Groſs of 144 to the Groſs.

COMPENDIUM 19.

By knowing the price of 1, to find the price of a Groſs.

RULE.

If the Price of 1 conſiſt but of one place of Figures only, multiply it by 3, and the *Units* Figure of that Product will be Shillings, and the Tens Figure will be Pounds. But if the Price conſiſt of two places of Figures, double the firſt place for Shillings, and the other Figures will be Pounds; to theſe Pounds and Shillings add half of themſelves, and the Sum will be the Anſwer.

EXAMPLES:

If 1 Yard of Cadows coſt 1 *d.* 1 *q.* what will ſ1 Groſs coſt?

5
3

Anſwer 15 *Shillings.*

If 1 Yard of Gartering coſt 3 *d.* 2 *q.* what coſt the Groſs.

1 8

14

Anſwer l. 2 2

COMPENDIUM 20.

By knowing the price of a Groſs to find the price of 1.

RULE.

Multiply the Price of the Groſs by 10, and from that Product ſubtract 1 3d of itſelf for the Anſwer in Farthings.

EXAMPLE.

If 1 Groſs coſt 2 *l.* 2 *s.* what will 1 Yard coſt?

10

$\frac{1}{3}$ 21 0

Anſwer 7 *Farthings*

Of GOODS ſold by the great Groſs, conſiſting of 12 ſmall Groſs, or 144 Dozen.

COMPENDIUM 21.

By knowing the Price of one in Farthings, to find the price of the Groſs.

RULE.

Multiply the Farthings which one coſts by 18, doubling the firſt Figure of the Product for Shillings, and it is done.

EXAMPLE.

If 1 Box-Comb coſt 7d. 1 q. what 1 Groſs coſt?

29
18

52 4 *Anſwer*

If 1 coſt 11*d.* 3 *q.* what will 1 Groſs coſt?

47
18

l. 84 12 *Anſwer*

N. B. If the Price of the Dozen be given to find the Price of the Groſs, it is done by the *Rule* in *Compendium* the 17th.

If the Price be given in Shillings and Pence.

R U L E.

Multiply the price in Pence by 6, doubling the firſt Figure of the Product for Shillings.

E X A M P L E.

If 1 Dozen of Silver Buttons coſt 5 s. 9 d. what will 1 Groſs coſt?

69
6

l. 41 8

COMPENDIUM 22.

By knowing the Price of a Groſs containing 144 *Dozen, to find the price of one Dozen.*

R U L E.

Multiply the Price of the Groſs by 5, and Divide that Product by 3, and the *Quotient* will be the Price of a Dozen in Pence.

E X A M P L E.

If 1 Groſs of Handkerchiefs coſt 31 l. 8 s. 6 d. what will 1 Dozen.

31 8 6
5

3)157 2 6

Anſwer Pence 52 7 6 *or* 4*s.* 4*d.* 2 *q.*

Wine

WINE MEASURE.

COMPENDIUM 23.

By knowing the price of a Gallon of Wine, to find the Price of a Tun.

RULE.

To the Price of one Gallon in Pence, add 1 20th of itſelf, and that Sum is the Anſwer.

RULE 2.

Multiply 1 *l.* 1 *s.* by the Pence which the Gallon coſt, and the Product is the Anſwer, or for every Penny that the Gallon coſt reckon 1 Guinea.

EXAMPLE.

Wine at 6 *s.* 3 *d. per Gallon*, what does a Tun coſt?

75
$\frac{1}{20}$ 3 15
l. 78 15 *Anſw.*

Claret at 6 *s.* 9 *d. per Gallon*, what the Tun coſt?

81
$\frac{1}{20}$ 4 1
l. 85 1

What coſt 7 Tuns of Wine at 6*s.* 11*d. per Gallon?*

83

$\frac{1}{20}$ 4 3

87 3 *price of* 1 *Tun*

7

Anſw. l. 610 1

COMPENDIUM 24.

By knowing the Price of a Tun to find the price of a Gallon.

RULE.

From the Price of the Tun ſubtract 1 3d of 1 7th, or 1 7th of 1 3d of the ſaid Price, and the remainder is the price of a Gallon in Pence.

EXAMPLE.

Wine at 78 l. 15 s. per Tun, what coſt the Gallon?

$\frac{1}{7}$ 11 5

$\frac{1}{3}$ 3 15

Anſwer 75 *Pence or* 6 *s,* 3 *d. per Gallon.*

Wine at 81 l. 4 s. *per* Tun, what coſt the Gallon?

$\frac{1}{7}$	11	12	
$\frac{1}{3}$	3	17	4

Anſwer l. 77 6 8 *or* 6 *s.* 5 $\frac{1}{3}$ *d.*

Of GOODS *ſold by the Pack of 240 lb. to the Pack.*

COMPENDIUM 25.

By knowing the price of 1 *lb. in Farthings to find the price of the Pack.*

RULE.

Divide the Farthings which the *lb.* coſt by 4, and the *Quotient* is Pounds, and if any thing remain they are ſo many Five Shillings.

EXAMPLE.

If I give 3 *d.* 2 *q. per lb.* for Dying, what is that *per* Pack.

$\frac{1}{4}$	14
	l. 3 10 *Anſ.*

If the price of the lbs. be Pence, or Shillings and Pence, to find the price of the Pack.

RULE.

For every Penny in the Price of the *lb.* reckon 20 Shillings in the price of the Pack; and for every Farthing reckon Five Shillings.

EXAMPLE

If 1 lb. of Yarn coſt 17 *d.* 1 *q.* what is that *per* Pack?

Anſwer *l.* 17 5

If 1 *lb.* of Iriſh Yarn coſt 19 *d.* 3 *q.* what coſt 1 Truſs.

l. 19 13 *per* Pack

Anſwer *l.* 19 15

COM-

COMPENDIUM 26.

By knowing the price of a Pack to find the price of 1 lb.

RULE.

For every Pound which the Pack coſt reckon one Penny in the price of the 1 *lb.* and for every Five Shillings reckon one Farthing.

EXAMPLE.

If 1 Pack coſt 18 *l.* 15 *s.* what will 1 *lb.* coſt?

Anſwer 18 *d.* 3 *q.*

If 1 *Pack* coſt 22 *l.* 7 *s.* 6 *d.* what 1 *lb.* coſt?

Anſwer 22 *d.* 1 *q. half Farthing*

Of Goods ſold by the Tun *weight.*

COMPENDIUM 27.

By knowing the price of 1 lb. *in Farthings, to find the price of a Tun weight.*

RULE.

Multiply the Price of 1 *lb.* in Farthings by 7, and Divide that Product by 3 for the Anſwer.

Or to 7 times the price of the *lb.* in pence, add 1 3d part of itſelf, and that Sum is the Anſwer.

EXAMPLE

EXAMPLES.

What coſt 1 Tun of Iron that is ſold at 7 *q.* *per lb.?*

7 *Farthings*
7
3)49

Anſwer l. 16 6 8

If 1 *lb.* coſt 16 *d.* what will 1 Tun coſt?

4
64
7
3)448

Anſwer l. 149 6 8

Or to 7 times the price of the *lb.* in pence, add 1 3d part of itſelf, and that Sum is the Anſwer.

If 1 *lb.* coſt 21 *d.* what will 1 Tun coſt?

7
147
$\frac{1}{3}$ 49

Anſwer l. 196

COM-

COMPENDIUM 28.

By knowing the price of a Tun weight to find the price of 1 *lb.*

RULE.

Multiply the price of the Tun by 3, and Divide that product by 7, the *Quotient* will be the *Answer* in Farthings.

EXAMPLE.

If 1 Tun of Iron cost 16*l.* 6*s.* 8*d.* what 1 *lb.* cost?

3

7)49 0 0 *oz*

7 *q. or* 1*d.* 3*q.*

If 1 Tun cost 31 *l.* 8 *s.* 6 *d.* what will 1 *lb.* cost?

3

7)94 5 6

Answer 13 9 4 *or* 3*d.* 1*q. half far. al.*

The END.

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